SHOUT
SHARE
IT

THE UNIVERSITY
OF ILLINOIS
LIBRARY
580.5
FB
v.15

BIOLOGY
NATURAL HISTORY
AUG 8 1939

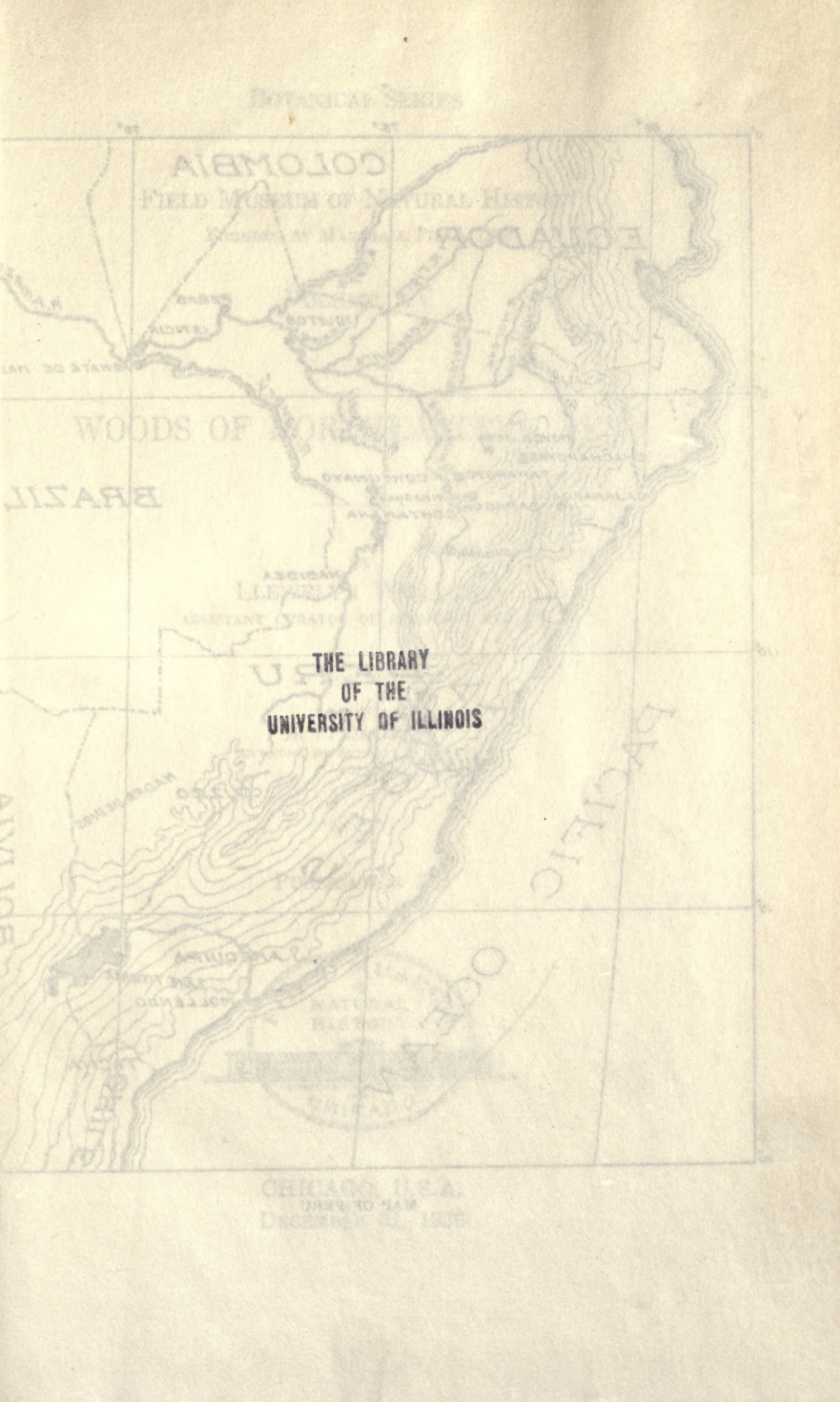
Return this book on or before the **Latest Date** stamped below. A charge is made on all overdue books.

U. of I. Library

APR 27 1943

MAY 17 19[illegible]

M32



THE LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

80°
75°
70°
0°
5°
10°
15°
20°
COLOMBIA
ECUADOR
R. Tigre
R. Napo
PEBAS
LETICIA
R. Amazon
IQUITOS
R. Ucayali
R. Marañon
R. Huallaga
R. Javari
REMATE DE MALES
MOYOBAMBA
CHACHAPOYAS
TARAPOTO
CONTUMAYO
CAJAMARCA
SAPASOA
YURIMAGUAS
CONTAMANA
BRAZIL
PISANA
MASISEA
PERU
ANDES
PACIFIC
OCEAN
LIMA
CUZCO
MADRE DE DIOS
BOLIVIA
AREQUIPA
LAKE TITICACA
MOLLENDO
TACNA
CHILE

MAP OF PERU

BOTANICAL SERIES

FIELD MUSEUM OF NATURAL HISTORY

FOUNDED BY MARSHALL FIELD, 1893

VOLUME XV

WOODS OF NORTHEASTERN PERU

THE LIBRARY OF THE
JAN 11 1937
UNIVERSITY OF ILLINOIS

BY

LLEWELYN WILLIAMS

ASSISTANT CURATOR OF ECONOMIC BOTANY

B. E. DAHLGREN

CURATOR, DEPARTMENT OF BOTANY

EDITOR

PUBLICATION 377

CHICAGO, U.S.A.

DECEMBER 31, 1936

PRINTED IN THE UNITED STATES OF AMERICA
BY FIELD MUSEUM PRESS

580.5
FB
v. 15

CONTENTS

PAGE

List of Illustrations 5
Introduction 7
Route 8
Geography of Peru 14
The Montaña 15
Formations and Associations 15
Tropical Lowland 16
Swamp Formation 16
Intermediate Formation 18
Flood-free Formation 20
Secondary Formation 22
Tropical Upland 24
Savanna 24
Grassland 24
Swamp Formation 26
Low Rain Forest 26
High Rain Forest 26
Subtropical to Temperate Zone 28
Transition Stage 28
Moorland 28
Inter-Andean Valleys and Slopes 30
Climate 30
Inhabitants 34
Communications 36
Agriculture 38
Forest Products 40
Descriptions of the Woods 60
Tables of Anatomical Characters of Peruvian Woods 511
Vernacular Names 536
Bibliography 568
Index 575

1056906

LIST OF ILLUSTRATIONS

MAPS

	PAGE
Peru . . . . . facing page	1
Northern Peru	9

TEXT FIGURES

1.	Scene on Marañón River	11
2.	Swamp formation, lower Itaya	17
3.	Intermediate formation, Pebas	19
4.	Flood-free formation, La Victoria	21
5.	Tarapoto and Guayapurima	25
6.	Cloud-covered forest, middle Huallaga	27
7.	Moorland (*jalca* or *puna*) between Bagasán and Molinobamba	29
8.	Scene near Río Utcubamba, upper Marañón	31
9.	Plain of Chachapoyas and Puma-urcu in the distance . .	33
10.	Climbing La Ventana, on the route from Moyobamba to Chachapoyas	35
11.	One of the series of rapids between Shapaja and Chasuta, middle Huallaga	37
12.	Rafts of mahogany logs at Nanay mills	43
13.	Nanay mills, near Iquitos	45
14.	Small Pará rubber plantation, lower Peruvian Amazon .	49
15.	"Nogal" or Peruvian walnut, *Juglans neotropica* Diels, at Chachapoyas	69
16.	"Huitillo," *Dialium* sp., near Yurimaguas, lower Huallaga	201
17.	"Cedro colorado," *Cedrela odorata* L., at Fortaleza, lower Huallaga	241
18.	Stump and trunk of mahogany, *Swietenia macrophylla* King, at Santa Rosa, lower Huallaga	247

WOODS OF NORTHEASTERN PERU

LLEWELYN WILLIAMS

INTRODUCTION

For the systematic study of its composition and forest resources, the Amazon region may be divided from east to west into three main zones: (1) lower Amazon or delta zone; (2) upper Brazilian Amazon, from Manáos westward; and (3) Peruvian Amazon and adjacent forest-clad foothills of the Andes, an expanse of vegetative growth which may be regarded as a continuation of the forests of the Brazilian Amazon.

Until 1922, when the first Field Museum expedition returned from Peru, herbarium specimens from the last-named zone, popularly known in Peru as the montaña, were scantily represented in botanical institutions in the United States.

All the early botanical exploration having been done by Europeans, Ruiz and Pavón, Mathews, Spruce, Jussieu, Poeppig, Ule, and recently by Tessmann and Weberbauer, their collections were distributed chiefly among herbaria in Europe. The Field Museum collections made by Macbride and Featherstone (1922), Macbride and Bryan (1923), and subsequently by Weberbauer, those made by Killip and Smith during 1929, and more recently by Mrs. Ynes Mexia, have secured for the United States a fair representation of the flora of Peru. Owing to impediments of travel and the difficulties trees always offer to the collector, no attempt had been made, however, to assemble a representative collection of the woods found in the montaña.

Through the generosity of Mr. Marshall Field, the writer was sent in 1929 by Field Museum to northeastern Peru for the purpose of making a general collection. After twelve months, most of which was spent in the forest, his work was brought to a conclusion in May, 1930. A large amount of herbarium material was assembled, comprising 8,252 field numbers and 22,500 specimens, also 2,500 samples of woods, study of which forms the basis of this publication.

Each wood specimen was accompanied by herbarium material which has been identified and described by specialists in their respective families, among whom may be mentioned Paul C. Standley (Rubiaceae, Nyctaginaceae, Polygonaceae, *Ficus*, Sapotaceae, Amaranthaceae, and miscellaneous material); J. F. Macbride (Leguminosae

and miscellaneous specimens); Ellsworth P. Killip (Urticaceae and *Cordia*); Ludwig Diels (Anonaceae); Hermann Harms (Meliaceae and Araliaceae); and O. C. Schmidt (Lauraceae).

The families are arranged according to the classification of Engler and Prantl and the genera and species are listed alphabetically. The résumé of general characters for families and genera is based essentially on species included in the collection and applies mostly to them. The descriptions of the trees and shrubs were compiled by the writer from his field notes. Descriptions of the physical properties and structure of the woods also are the work of the author. No species has been included of which complete herbarium material, sufficient for determination, was not obtained.

The writer wishes to express his indebtedness to Samuel J. Record, Professor of Forest Products at Yale University School of Forestry and Research Associate in Wood Technology at Field Museum, for many helpful suggestions, his cooperation in checking over the determinations of the woods, and permission to study microscopic slides of material prepared for the Yale collections.

ROUTE

After a brief stop in Pará, Brazil, I proceeded by steamer for 2,300 miles along the Amazon River to Iquitos, the largest town in Peru east of the Andes and capital of the Department of Loreto. Situated on the left bank of the main stream, some two hundred miles within the border, and in the heart of the lowland forest, Iquitos proved to be most satisfactory as a base. The first two weeks were spent in collecting in the neighborhood of the town, adjacent to the Itaya, a small affluent of the Amazon, and along the banks of a small stream, the Masán. Around Iquitos the land has been cleared, but along the right bank of the Amazon, opposite the town, little cutting has been done and good collecting is found in the forest.

From Iquitos I proceeded to the estuary of the Nanay River, which has its confluence with the Amazon about six miles below Iquitos. During two weeks' stay at Nanay, I lived in a house placed at my disposal by the Astoria Manufacturing and Importing Company of Long Island City, New York, which operated a saw-mill at this center. A short distance inland there is a large village inhabited by Iquito Indians. The forest growth surrounding this village is dense, the terrain undulating, and the altitude slightly higher than that of the lower Itaya, but the composition of the forest in the two areas is similar. Towards the end of April, in the company of a guide and

MAP OF NORTHERN PERU DENOTING REGIONS WHERE COLLECTIONS WERE MADE

------- indicates route followed; —·—·— indicates boundary lines.

porters, I journeyed by canoe for five days up the Nanay River until a suitable spot for botanizing was reached. During the several weeks spent there, daily trips were made in the direction of the Tigre River and along the banks of the Nanay. At the conclusion of the work on the upper Nanay, a visit was paid to Pebas, a small Yahua Indian village on the left bank of the Amazon below the estuary of the Napo River. A stay of two weeks at this place provided an opportunity to obtain information pertaining to medicinal and other uses made by the Indians of various herbs, shrubs, and resins.

Thus far, most of the collecting had been done in the forest along the north bank of the main stream. The first stop after leaving Pebas was at Cochiquinas and a few miles farther east is the town of Caballo-cocha, on the south bank of a stream flowing parallel with the Amazon. A short distance west of the town there is a lagoon, which is one of the largest permanent bodies of water in the Peruvian lowlands. During the rubber boom, two decades or more ago, Caballo-cocha formed an important center for the Javary region.

Thanks to the interest and hospitality of Dr. E. Virgil, of Iquitos, and Señor Jorge Giles, owner and manager respectively of a sugar cane plantation, several trips were made from La Victoria, near the Peruvian-Brazilian border, in the direction of the Putumayo River, one of the larger tributaries of the Amazon, having its source in Colombia. From here a return was made to Iquitos and, before undertaking the next prolonged journey, a brief trip was made up the Itaya River to the *fincas* San Antonio and Paraíso, where excellent collecting was found in the forest along the stream.

For the next six months, from the middle of September until the middle of March, collections were made in the lower Huallaga, a territory known by the earlier botanists as Mainas, along the slopes of the Andean foothills, and in the plains and valleys in the departments of San Martín and Amazonas. The journey from Iquitos to Yurimaguas takes about five days by river launch. A few miles above the junction of the Ucayali with the Marañón is the village of Nauta. Beyond this village, the river banks are low and covered with dense vegetation, especially palms such as *Attalea* and *Astrocaryum*, until the village of Parinari is reached. A few miles up the Huallaga River is the village of Laguna.

The town of Yurimaguas, capital of the District of Yurimaguas, is situated on the left bank of the Huallaga, at the head of navigation for launches plying between Iquitos and the Huallaga. About half a mile below the town the Paranapura unites with the Huallaga.

FIG. 1. Scene on Marañón River, near its junction with the Ucayali (alt. 450 ft.).

To the west is the village of Muniches and beyond this point the trail leads through Balsapuerto to Moyobamba, thence to Chachapoyas, Cajamarca, and the Pacific coast. For the successful results attained in collecting along this trail to Balsapuerto, the writer is indebted to Señor Enrique Pardo, at whose *finca*, Fortaleza, generous hospitality was received. Another locality where satisfactory conditions for collecting were found was a clearing made through the forest for a proposed railroad from Yurimaguas to the coast. Along this right of way it was fairly easy to obtain complete specimens of even the largest trees. Additional collections were assembled at Puerto Arturo, a sugar cane plantation below Yurimaguas, and also at Santa Rosa and Sapote-yaco.

Through the cooperation of Señor Miguel Acosta, a merchant in Yurimaguas, porters were hired to carry the equipment on a six-days' journey over rocky, muddy paths, steep ascents and descents to Tarapoto, made famous by Richard Spruce, who collected there about eighty years ago. The town is situated at an altitude of 1,400 feet in the center of an extensive plain and almost completely encircled by ranges and high spurs which are ramifications of the eastern Cordillera of the Andes. These ranges rise to 2,000 feet or more above the general level of the plain. To the southeast and south of the town the plain stretches for several miles towards the Huallaga, while towards the east and northeast there is a gentle rise in the ground until it reaches the valley of the Ahuashi-yaco. To the north is the ridge of Cerro Pelado, the summit of which is devoid of vegetation, whence the name meaning "bald hill."

Several trails lead from the town, forming the only means of communication with other points. That to Chasuta, on the left bank of the Huallaga below the rapids, follows an easterly course through Cumbasa. Beyond the Ahuashi-yaco it emerges on a wide plain, extending as far as Puca-yaco, and beyond this plain or campo rise the abrupt ridges of Guayapurima, which have to be crossed to reach Chasuta. In a southern direction, a trail leads over a sandy plain to Shapaja, on the left bank of the Huallaga above the rapids, and continues for a short distance to Juan Guerra, at the confluence of the Mayo and Huallaga rivers. Beyond the Mayo it leads through the forest, almost parallel with the Huallaga, to Saposoa, Juanjui, Pachisa, and other villages in the upper reaches of the river. To the northwest of Tarapoto, a trail leads through Morales, Rumisapa, Lamas, Tabalosos, and San Roque to Moyobamba and the coast, while farther north is the overland route to Yurimaguas.

With the completion of work in the vicinity of Tarapoto I moved to Lamas, originally known as Corrigimiento, a village about ten miles to the north and situated at an altitude of 2,500 feet near the summit of a dome-like hill. Three days were spent at this place before continuing to Tabalosos, on the right bank of the Mayo, and through heavily wooded gorges with rugged cliffs to San Roque. This small Indian village is situated at an altitude of about 2,700 feet, at the foot of a round, barren hill, Campana, with an elevation at its summit of approximately 3,800 feet. Many excursions were made along the slopes and summit of this hill and through the forest westward in the direction of Moyobamba, where Alexander Mathews, the English botanist, collected almost one hundred years ago. The town of Moyobamba is located in the center of a fertile plain on the right bank of the Mayo River. The most noticeable feature of the landscape is a dome-like hill, El Morro, which rises out of the flat valley extending alongside the Indoche River. At Moyobamba mules were hired to carry the equipment on a six days' journey over mountainous country to Chachapoyas.

Soon after leaving the town, the path leads through a narrow ravine, emerging on a sandy stretch covered with low vegetation of a shrubby character. A few miles farther on are the Indoche and Tonchimán rivers, both tributaries of the Mayo which at all seasons of the year are too deep to be forded. Approximately twelve miles beyond Moyobamba is the village of Rioja, located on an open, gently sloping, sandstone plateau at an altitude of 2,600 feet, and famous in northern Peru for the so-called "Panama" hats manufactured there from the young, unopened leaves of the palm-like "bombonaje," *Carludovica palmata* R. & P. Beyond Rioja a dry, fern-covered plain is the dominating note of the vegetation, but the banks of the Uquihua, Negro, and Tambo-yaco are fringed with dense growth of low trees. Beyond these streams is the Ventana, a round-topped mountain clothed with dense forest. In places the trail resembles a narrow ditch, leading over precipitous ascents and down steep declivities, and at times strewn with fallen trees and straggling vines. As we progressed westward, each day brought a marked lowering in temperature and the vegetative growth became more stunted. These wooded ridges are known locally as *ceja de la montaña* (brow of the forest). At Bagasán, an uninhabited spot at an altitude of 9,750 feet, the forest growth comes to an abrupt termination. Beyond this is the *puna* or *jalca*, Piscohuañuna, an open, cold moor with an average elevation of 10,700 feet. Near

its crest there is a small lake, Cochaconga, and at the foot of the descent is a small grass-covered pampa or plain. On the west side of this plain is the dome-like Ventilla and beyond this bluff, as far as Molinobamba, the land is moderately flat and covered with low shrubs and grass. From Molinobamba to Chachapoyas, a distance of eighteen miles, the trail is wide and in good condition for travel, leading through broad valleys and along the slopes of fairly high ridges.

Chachapoyas, capital of the Department of Amazonas, is situated at an altitude of 7,580 feet on an undulating plain almost entirely surrounded by lofty sierras. The principal objective of the visit to this region was to secure specimens of a kind of walnut known to grow there.

At the end of January, 1930, I returned to Moyobamba, thence to San Roque. The material assembled at the various centers was packed and transported on the backs of Indians to Tarapoto, and from there on muleback to Shapaja. Between Shapaja and Chasuta the Huallaga is boxed in by high cliffs, and a series of rapids and whirlpools between the two villages renders traveling downstream perilous. At Shapaja a raft was constructed of "topa," *Ochroma*, on which were placed the collections and equipment for shipment to Yurimaguas. Here all the material had to be redried, repacked, and loaded aboard a steamer for transport to Iquitos.

GEOGRAPHY OF PERU

The Republic of Peru occupies territory on the Pacific coast and is the third largest of the South American countries. Its coast line extends for about 1,400 miles, almost from the Equator to the Tropic of Capricorn, and the country has an approximate width of from 200 to 700 miles. Including the territory of Tacna, its total area is about 550,000 square miles and the population is estimated to be between five and six millions. For administrative purposes, the Republic is divided into nineteen departments and three littoral provinces. The departments are subdivided into provinces, and the latter into districts. The departments and littoral provinces are governed by prefects and the provinces by subprefects, both appointed by the president, the first-named being responsible to the chief executive, and the last-named to the prefects. In the districts there are governors appointed by the prefects.

The Republic has three main physiographic zones, characteristic of the western countries of South America within the tropics: namely,

(1) a narrow, arid, coastal plain with tributary mountain valleys; (2) the high Andean ranges—western, central, and eastern Cordilleras—varying in width from 200 to 250 miles; and (3) an eastern region of dense forest, the montaña, beginning at the tree line upon the eastern slopes of the Andes and extending eastward into the tropical lowlands of the interior. For a discussion of the vegetation of the zones and subzones, the reader is referred to "The Phytogeography of the Peruvian Andes" by Dr. A. Weberbauer (in Macbride, Flora of Peru, Field Mus. Bot. 13, pt. 1: 13–81. 1936).

THE MONTANA

This luxuriant forest region constitutes more than half the total area of the Republic, equivalent to about 300,000 square miles or approximately 192,000,000 acres. The greater part of it lies within the departments of Loreto, San Martín, Amazonas, and Madre de Dios. It has an approximate length of 1,000 miles, and a width of from 300 to 650 miles. Its general outline is V-shaped, conforming with that of the country, extending from Ecuador and Colombia on the north, and, where it is widest, as far south as the southern limit of Madre de Dios, adjacent to the Peruvian-Bolivian border. The eastern limit is formed by the Brazilian forests and the western is on the slopes of the Peruvian Andes at altitudes up to about 9,000 feet or more.

An approximate idea of the composition of the forest may be obtained from the following data, expressed in terms of percentages computed from the number of species, so far determined, of trees and shrubs in individual families in relation to the total number of species in the entire collection (omitting the Myrtaceae, only a few of which have been determined):

Families	% for each family
Leguminosae, Melastomaceae, and Rubiaceae	9–16
Anonaceae, Apocynaceae, Euphorbiaceae, Flacourtiaceae, Lauraceae, Meliaceae, and Moraceae	4–6
Monimiaceae, Rosaceae, Rutaceae, Sapotaceae, and Sterculiaceae	2–3
Anacardiaceae, Boraginaceae, Capparidaceae, Compositae, Erythroxylaceae, Guttiferae, Malpighiaceae, Myrsinaceae, Olacaceae, Piperaceae, Sapindaceae, Solanaceae, and Tiliaceae	1–2
Caryocaraceae, Ebenaceae, Juglandaceae, Lecythidaceae, Loganiaceae, Malvaceae, Salicaceae, and Simarubaceae	less than 1

FORMATIONS AND ASSOCIATIONS

The plant associations vary greatly within the montaña but in no instance do we find pure stands of any particular species. Some types, such as *Hevea*, are confined to the lowlands, others, like *Swie-*

tenia macrophylla King, are found in both the lower and higher altitudes (up to about 3,000 feet). Certain other plants, *Cinchona*, for example, show affinities with the Andean flora, while walnut, *Juglans neotropica* Diels, may be regarded as typical of the higher regions with elevations of 5,900 feet or more. For a discussion of the various formations, the forest growth is divided into the following main regions: (1) tropical lowland; (2) tropical upland; (3) subtropical to temperate zone.

TROPICAL LOWLAND

In the Department of Loreto, the rubber and balata gatherers and others familiar with the forest recognize two main formations, *tierra baja* and *altura*, but in between these there are intermediate types of growth, the entire series constituting the primary and secondary rain forests.

Swamp formation.—The *tierra baja* includes river banks, sand banks or *playas*, swampy land, and areas subject to inundations during the rains. This formation is poor in shade plants, especially ferns. Common aquatic grasses include *Panicum barbinode* Trin. and *Oryza latifolia* Desv. A little farther in, the undergrowth is composed of the giant grass, *Gynerium;* herbaceous plants, such as *Desmodium, Hyptis, Caladium, Wedelia, Cuphea,* and *Aciotis;* undershrubs and erect shrubs, among them *Couepia Ulei* Pilger, *Dalbergia inundata* Benth., *Rudgea amazonica* Muell. Arg., and *Solanum;* and, reaching into the upper branches of the trees, slender-stemmed, woody climbers, *Cuphea speciosa* O. Ktze., *Banisteria elegans* Planch. & Triana, *Ipomoea, Passiflora,* and *Stigmatophyllon tiliifolium* Ndzu. In this thicket such palms as *Astrocaryum, Bactris,* and *Euterpe* are well represented. Many of the trees lose their foliage when the waters recede but others are evergreen. Among the trees forming the lower story are *Inga marginata* HBK., a tree from 25 to 55 feet tall, with fragrant white flowers; "canela," *Endlicheria anomala* Nees, a slender tree, up to 25 or 40 feet in height; *Tocoyena amazonica* Standl., an unarmed tree up to 30 feet tall; "setico," *Cecropia* spp., small or medium-sized trees readily distinguishable by their smooth, whitish trunks, which are hollow and habitually infested with small, stinging ants; *Coccoloba* and melastomes. Among the tallest trees and perhaps the most prominent, on account of its smooth bark, which is light green when fresh and turns to coppery brown with age, is the "capirona," *Calycophyllum Spruceanum* Hook. f. It has a straight, columnar trunk, and is typical of swampy patches along the banks of the main stream

FIG. 2. Swamp formation, lower Itaya (alt. 400 ft.).

and its principal tributaries. Its timber is burned in enormous quantities by launches plying on these rivers. In addition, we find other large trees, such as "pashaco," *Acacia*, often with flat or almost flat crown and bright yellow, showy flowers; *Piptadenia flava* (Spreng.) Benth., an armed tree with wine-red flowers and yellowish or reddish brown staminal filaments; *Hura crepitans* L., a medium-sized or tall tree with a large-limbed, wide-spreading crown and with numerous conical prickles which usually beset the lower part of the trunk, particularly of young trees; and occasionally "tangarana," *Triplaris*, trees of very rapid growth and of peculiar interest because their hollow stems are occupied by hosts of venomous ants, known also as "tangarana," which emerge quickly and rain down on an intruder upon first contact with the trees.

Intermediate formation.—This type constitutes the transition between the *tierra baja* and the *altura*, the region not subject to seasonal inundations. The contour of the land may be flat or slightly undulating, the soil is of a heavy loam or clay, has a fairly good drainage, and is either subject to floods during the rainy period or is situated beyond the reach of inundations. In this type we find dense, tall growth and some of the timbers are of economic importance. Of the species obtained here, some grow in the non-inundated forests, others in both the swamp and dry land formations. The presence of *Swietenia macrophylla* King and *Hevea* are indicative of the type.

In association with mahogany are usually found "cedro colorado," *Cedrela odorata* L., often up to 80 or 100 feet or more in height, with timber noted for its fragrance, ease of working, durability, and stability; "almendro," *Caryocar glabrum* (Aubl.) Pers., a tall tree, from 60 to 120, occasionally up to 150, feet in height, with full spreading crown, straight columnar trunk, and nuts containing edible kernels; and "caimito," *Lucuma Caimito* Roem. & Schultes, one of the most highly esteemed fruit trees, which has a compact, heavy, strong wood with an attractive dark color and without sharp distinction between the sapwood and heartwood. Smaller trees include *Matisia cordata* Humb. & Bonpl., a tree with heart-shaped leaves, caulescent flowers, and fruit which is edible when green; *Theobroma subincana* Mart. and *T. Cacao* L., the last well known as the source of cacao seeds and often cultivated; *Coutarea hexandra* K. Schum., a slender tree with bitter bark sometimes employed as a substitute for quinine; and "cuchara-caspi" or "chicle," *Malouetia Tamaquarina* A. DC., a medium-sized tree furnishing a copious quantity of latex.

FIG. 3. Intermediate formation, Pebas (alt. 380 ft.).

Rubber trees, *Hevea*, are very well represented in the Peruvian Amazon region and are esteemed as the source of Pará rubber. They are abundant in the region of the Javary, middle and upper Nanay, Ucayali, and their tributaries, and are usually encountered close to the river banks. Incidentally, they appear to be more common in the forests along the right banks of the rivers. Their timber is white, soft, and liable to stain readily in drying. It occupies a secondary place from a commercial standpoint. In association with rubber trees grow equally tall trees, say from 90 to 140 feet or more, such as *Manilkara bidentata* (A. DC.) Chev., which furnishes a latex, the balata of commerce; *Sideroxylon*, some of which supply hard, heavy woods of a pale yellow or orange color; "naranjo podrido," *Parahancornia Amapa* Ducke, the latex of which is sometimes used to adulterate balata; "itaúba amarilla" and "loromicuna," *Pseudolmedia*, the bitter, yellowish latex of which is also mixed with balata; sapotaceous trees of the genus *Couma; Castilla Ulei* Warb., the source of castilloa rubber of the Peruvian Amazon; *Bertholletia*, lofty trees furnishing hard, heavy, strong, tenacious, and durable wood, well suited for all kinds of construction and for use in exposed places; *Lecythis*, some of which form the most ornamental trees of the forest, having a copious foliage, and inner bark that separates into numerous, thin sheets; and "balata blanca," *Chrysophyllum Klugii* Baehni, a tree up to 150 feet tall, with a heavy, reddish brown wood. Others, not so large, are *Mabea subsessilis* Pax & K. Hoffm., a tree with light, soft wood suitable for general carpentry, crating, and possibly for paper pulp; "pucuna caspi," *Lucuma bifera* Molina, a tree with large, reddish flowers and with wood that is used by the Indians for making blowpipes; and "charichuela," *Rheedia macrophylla* Planch. & Triana, which furnishes a resin used for calking canoes and launches.

Flood-free formation.—This type, beyond the reach of seasonal inundations, corresponds to the *altura*, and may be considered as the climax of the rain forest. The numerous dicotyledonous species composing this formation are disseminated throughout the forest without apparent order or succession, and inhabit both level land and slopes. The forest floor is covered with a carpet of dead leaves, small herbaceous plants, and low ferns. Above these are straggly or erect, woody shrubs, among them species of *Faramea, Macoubea, Clidemia, Psychotria, Cephaelis, Endlicheria, Miconia*, and *Solanum*. Among arborescent species there is a gradual increase in stature. Those forming the lower story, say up to 30 feet, are straggly

FIG. 4. Flood-free formation, La Victoria (alt. 380 ft.).

or erect trees with short, slender trunks. Of these, mention may be made of species of *Zschokkea, Duroia, Ogcodeia, Sickingia, Connarus, Zanthoxylum, Trichilia, Schoenobiblus,* and *Mauria.* The middle story, between 30 and 70 feet, is composed of trees usually with slender boles divided into few leaf-bearing branches, the last inclined to be vertically disposed and to form dense crowns. Along the margins of the forest, where the trees have been cut for plantations and where there is more abundant light than in the interior of the forest, the vegetation of the lower stories becomes more dense and the vertical gradation is more pronounced. Trees represented in the middle story are species of *Theobroma, Erythrina, Guarea, Iryanthera, Rinorea, Warscewiczia, Sloanea, Swartzia, Rheedia,* and *Prockia.*

Finally, we have the upper story composed of large trees, ranging in height up to 150 feet or more, with long, columnar, or tapering trunks, undivided for the greater part of their height, often with large buttresses, in some instances, mahogany, for example, reaching to 15 feet in height, and with irregular crowns of twisted, knotted branches. Prominent among these are mahogany or "aguano," *Swietenia macrophylla* King; "estoraque," *Myroxylon balsamum* Harms, the bark of which is the source of an oleoresin known as tolu balsam, its timber being esteemed for rollers for crushing sugar cane; "azúcar huayo," *Hymenaea palustris* Ducke, in which the seeds are imbedded in a succulent, edible pulp, whence the local name; *Jacaranda;* "tahuari," *Tabebuia* sp., a conspicuous tree in the forest when in flower, with dense heartwood, which contains lapachol and is esteemed for piling and rollers for crushing sugar cane, while the inner bark separates into numerous thin sheets; "copal caspi," *Protium puncticulatum* Macbr. and *P. Carana* March., both of which yield a yellow resin used for calking canoes and launches; *Zanthoxylum; Pterocarpus Ulei* Harms, its cylindrical trunk often clear of limbs up to 80 feet; *Coccoloba Barbeyana* Lindau; "lagarto caspi," *Calophyllum brasiliense* Camb., its timber esteemed for dugout canoes and flooring; "capinuri" or "huariúba," *Clarisia,* which also furnishes timber for dugout canoes; "leche-caspi," *Sapium,* characterized by an abundance of latex exuding from the bark when cut; and "itaúba amarilla" or "loro micuna," *Pseudolmedia,* which furnishes a milky sap employed for adulterating balata.

Secondary formation.—As pointed out in the discussion of systems of agriculture practised in the montaña, there are two ways of clearing land for tillage: by burning the forest growth without resorting to

cutting, or, in the more humid regions, by simply felling the trees, which is the more common practice. In this manner much of the original vegetation remains and, since the land is not permanently or continuously tilled, it is soon reoccupied by trees and shrubs not found in the original forest.

Many of the species found in the initial stages of secondary growth are fast-growing, soft-wooded, short-lived trees. Typical representatives of this type are "nina caspi" or "palo de candela," *Crataeva Tapia* L., the fresh wood of which has a garlic-like odor; "palo de balsa," *Ochroma*, distinguished not only by its extremely light wood, used for rafts, but also by its large simple leaves, large solitary flowers, and very distinctive fruit with small grape-like seeds imbedded in a silky down; "machete vaina," *Bauhinia*, a small tree from 20 to 40 feet in height; "shimbillo," *Inga*, with rather showy flowers and large pods in which the seeds are imbedded in a white edible pulp; "retama," or "sapechihua," *Cassia reticulata* Willd.; "huimba" or "punga," *Bombax*, which has pea-like seeds imbedded in silk-cotton, and flowers appearing when the trees are bare of leaves; *Bothriospora corymbosa* Hook. f.; "bolaina," *Guazuma crinita* Mart., furnishing timber for sugar boxes and crates; also "iumanasi" or "lluicho-vainilla," *G. ulmifolia* Lam., the inner bark of which is used for cordage and its wood for tool handles and joinery; "pichirina," *Vismia*, readily distinguishable by the yellowish resin exuding when the bark is cut; "atadejo," *Trema micrantha* (L.) Blume, the bark of which supplies a very strong fiber for cordage while the flexible twigs are woven into baskets; and *Clidemia hirta* (L.) D. Don and *Oliganthes discolor* Sch. Bip., belonging to the Compositae family.

In pastures, thickets, and in the vicinity of abodes common species are "achiote," *Bixa Orellana* L., in which the seeds are covered with a thin, soft, slightly sticky, vermilion-colored pulp used for coloring foodstuffs; "ángel sisa," *Caesalpinia pulcherrima* Sw., planted commonly for ornament; and such fruit-bearing trees as "cashew" or "marañón," *Anacardium occidentale* L., which furnishes the cashew nuts of commerce; "guava" or "guayaba," *Psidium Guajava* L., one of the favorite fruit trees, its fruit often used for making guava paste; "palta," *Persea americana* Mill., furnishing one of the most highly esteemed fruits of tropical America; *Inga; Cassia;* "ciruelo" or "ubo," *Spondias Mombin* L. and *S. purpurea* L., furnishing fleshy fruits suggesting small plums in appearance and taste; several species of *Citrus;* "árbol del

pan," *Artocarpus communis* Forst., a handsome, medium-sized or large tree with dense round crown, native of the East Indies and Pacific islands, and planted plentifully, especially in the lowland, for its edible fruit and as shade; and "mango," *Mangifera indica* L., native of the East Indies, which furnishes a succulent fruit.

TROPICAL UPLAND

In the upland region there is a wider range of formations than in the tropical lowland, comprising savanna, grassland, swamp formation, and low to tall rain forest. Near Rioja, Moyobamba, San Roque, Lamas, and other centers not far from the Mayo River, there is an alternation of swamp formation, small patches of evergreen savanna, open areas with rough grass and scant growth which Dr. Weberbauer prefers to call "evergreen grass steppe," and tall rain forest. Around Tarapoto, where the altitude is upwards of 1,400 feet, there is a dry formation in the plain, while the growth along the banks of the Huallaga and Mayo rivers is of the swamp type. The lower limits of the slopes surrounding the plain are covered with secondary growth, but in the upper part of the slopes and along the summit of the ridges the forest growth consists of species some of which are peculiar to the higher altitudes but merge without interruption with the forest of the tropical lowland. The Peruvians call these sharp ridges *cuchillos* (knives).

Savanna.—The climate in the plain of Tarapoto is drier than on the surrounding slopes, and the evaporation under the intense heat of the afternoon sun is so rapid that the soil can not retain sufficient moisture for extensive tree growth. The soil, of loose sand, is covered with tufts of coarse grasses, scattered shrubs, and clumps of small trees, either deciduous or evergreen, suggesting a subxerophytic formation. The principal arborescent species found here are *Psychotria viridis* Ruiz & Pavón, *Siparuna guianensis* Aubl., *Zanthoxylum,* and *Lippia virgata* Steud. Coconut palms, *Cocos nucifera* L., doubtless introduced, are also common. Among herbaceous plants are *Oxalis, Setaria geniculata* Sieber, *Sida cordifolia* L., *Ocimum americanum* L., *Lantana Camara* L., *Xylopia aromatica* Baill., *Rudgea, Croton peruvianus* Briq., *Helicteres pentandra* L., and *Baccharis.*

Grassland.—This type includes slopes where the soil varies from sandy loam to heavy clay. Streams are few or wanting, and there is no appreciable variation in the seasons. The flora in this type is poor in number of species. Ligneous plants are either absent or but scantily represented by straggly trees and shrubs, such as

FIG. 5. Tarapoto and Guayapurima in the distance (alt. 1,400–2,500 ft.).

Bonnetia paniculata Spruce and *Curatella americana* L., which are found mainly adjacent to the margins of timber growth. The most prominent elements are grasses, up to 2 feet or more in height, and Cyperaceae. These patches of grassland reach to an altitude of approximately 6,350 feet.

Swamp formation.—The contour of the land is of a rolling or broken nature and this type is confined mainly to the margins of the Huallaga, Mayo, and tributaries of the last-named, such as the Negro, Seco, and Uquihua. The most characteristic species of swampy patches, especially in the vicinity of Rioja, is the "bombonaje," *Carludovica palmata* Ruiz & Pavón, the young, unopened leaves of which furnish a fiber for the manufacture of hats. Common palms are *Phytelephas* and *Astrocaryum*, extending up to an altitude of 3,900 feet or more. The Musaceae (*Heliconia*) and Zingiberaceae (*Costus*) are found up to 4,350 feet.

Low rain forest.—This type occurs in depressions and along the lower limits of slopes, which, although not interrupted by watercourses, yet obtain the benefit of rain water. In such formation are found patches of grasses, bright green during the humid months but withered during the dry period. Epiphytic vegetation consists of orchids and tillandsias. Palms are absent. Among the shrubs, some of which reach the size of small trees, are *Jatropha*, *Croton*, *Sida*, *Vernonia*, *Simaruba*, and *Dictyoloma peruvianum* Planch. Among the taller trees, most of which are deciduous, are *Ochroma boliviana* Rowlee, *Ficus gemina* Ruiz, *Vochysia Haenkeana* Mart., *Didymopanax Morototoni* Decne. & Planch., *Pithecolobium Mathewsii* Benth. and *P. Saman* Benth., and *Cedrela fissilis* Vell.

High rain forest.—Along the slopes and exposed summits constant fogs characterize the climate, heavy rains are frequent, and the east winds temper the relatively low temperature of the exposed summits. The forest growth is dense, especially in shady ravines and depressions, but in general it is lower in stature than that of the tropical lowland, and has an average height of approximately 50 feet. Among the taller trees growing in this region are: *Swietenia macrophylla* King, *Cedrela*, *Zanthoxylum Pterota* HBK., *Guazuma ulmifolia* Lam., *Apeiba Tibourbou* Aubl., *Manilkara bidentata* (A. DC.) Chev., *Aspidosperma subincanum* Mart., *Cespedesia Sprucei* V. Tiegh., *Aniba*, *Banara nitida* Spruce, *Phoebe pichisensis* A. C. Smith, *Jacaranda*, and *Sclerolobium Uleanum* Harms. In places along wind-blown summits of the sharp-edged ridges are patches of coarse grasses and small trees such as *Bonnetia paniculata* Spruce.

FIG. 6. Cloud-covered forest, middle Huallaga, between Yurimaguas and Tarapoto (alt. 2,000 ft.).

SUBTROPICAL TO TEMPERATE ZONE

Transition stage.—The upper montaña, ranging from subtropical to temperate belts, extends from an altitude of about 5,360 to 10,700 or 11,700 feet and corresponds to the *ceja de la montaña* (brow of the forest). Fogs are prevalent in this region and the climate is moist. As we travel westward, the segregation of the various formations becomes more evident. There is a gradual decrease in the height of the trees, which become less frequent and finally disappear. There is also a downward gradation in the height of the shrubs. A characteristic feature of the woody plants is their hard, leathery leaves. At certain intervals the timber growth is interrupted by huts (*tambos*) used by travelers for shelters, and surrounded by evergreen patches of grass and other herbaceous plants which provide pasture for mules. These small areas are the result of cutting the woody growth to furnish fuel for cooking. Prevalent in this type are epiphytic ferns, lichens (*Usnea* and *Sticta*), and mosses that form a ground carpet and envelop the stems of trees and shrubs. Palms, Marantaceae, and heliconias, common in the tropical growth, reach only as far as the lower limits, but unlike the montaña proper there is an abundance of handsome tree ferns and some species of Ericaceae and of other families which are but poorly represented in the eastern forests. On the other hand, we find Araliaceae, Lauraceae, Orchidaceae, and Melastomaceae, and many other groups that contribute to the characteristic flora of the montaña. This woody formation covers vast areas, extending upward in ravines, and alternates with small meadows and open grassland.

Moorland.—Beyond this formation of low trees and shrubs is the *jalca*, *puna*, or *páramo*, a vast, bleak tract of land that is partly broken, with an altitude of upwards of 10,000 feet. In this region the climate is moist, the sky is continuously cloudy, fogs are constant throughout the year, and the exposed slopes and summits are swept by heavy rains, hailstorms, and strong winds. This region is uninhabited and the Peruvians usually refer to it as *despoblado*. At the lower limit the soil is a dark brown slate, but along the summit this is replaced by sandstone and coarse granite. The vegetation is dominated by a thick tangle of rather tall grasses, such as *Festuca*, with hard, narrow, dry blades, evidently adapted to endure for a long time. This density is increased by dead blades, which do not decay readily because of the low temperature. Shrubs, often thorny, are confined mostly to the lower slopes. On these moors *Sphagnum*, *Carex*, and plants of the genus *Puya* are common.

FIG. 7. Moorland (*jalca* or *puna*) between Bagasán and Molinobamba (alt. 10,000 ft.).

Inter-Andean valleys and slopes.—After passing the puna and beyond Molinobamba one notices a surprising change in the climate as well as in the character of the vegetation. The climate is dry, with an abundance of sunshine, and the soil is dry as indicated by the presence of columnar cacti, *Cereus*, *Cephalocereus*, and *Fourcroya*, the last being the largest plant with succulent leaves. These extend high up the slopes of the valleys. In this type of vegetation, trees are rather scantily represented and herbaceous growth is also meager.

In the vicinity of Chachapoyas shrubs and small trees grow together, or in patches shrubs alone are found on steep slopes, in depressions, or in the vicinity of watercourses. Among the low shrubs are *Embothrium mucronatum* Willd., *Gaultheria erecta* Vent., *Dodonaea viscosa* Jacq., *Arcytophyllum thymifolium* Standl., and *A. setosum* Schlecht., *Miconia crassifolia* Triana, *Rhamnus pubescens* Tr. & Pl., *Baccharis odorata* HBK., and *Brachyotum Trianaei* Cogn. Representatives of tall shrubs are *Psammisia Ulbrichiana* Hörold, *Brachyotum lycopodioides* Triana, and *Cordia rotundifolia* Ruiz & Pavón.

The most useful and esteemed timber tree growing around Chachapoyas, also to the east around Daguas and along the banks of the Utcubamba River, to the west, is the deciduous walnut or "nogal," *Juglans neotropica* Diels, in some places planted for its nuts. Exotic trees found here are *Eucalyptus* and *Olea*. In the direction of the Utcubamba and towards the upper Marañón, we find such evergreen trees as *Sapindus Saponaria* L., *Salix chilensis* Mol., *Guazuma ulmifolia* Lam., *Triplaris*, and *Ochroma boliviana* Rowlee, types belonging to the flora of the montaña.

CLIMATE

Notwithstanding its equatorial location, the region does not deserve the evil reputation it has borne as having an especially hot, humid, and unhealthy climate, rendering it almost uninhabitable. On the contrary, it has a relatively pleasant climate and for the most part is free from dangerous diseases which usually prevail in torrid zones. At Iquitos, for example, the mean annual temperature is 70° F. It is true that in some isolated swampy areas in the lowlands, such as the Javary region, epidemics sometimes break out during the months from May to August. The most prevalent ailments are intermittent fever, anemia, and isolated cases of yellow fever. There are extensive regions, however, entirely free from these diseases.

Among the Indians skin diseases are common and, under the general term *sarna*, include all forms of eruptions, discolorations,

FIG. 8. Scene near Rio Utcubamba, upper Marañón, illustrating shrubby growth in depressions or near watercourses in the upland (alt. 5,000 ft.).

and infections. Perhaps the most troublesome pest is the mosquitoes, of which there appear to be two kinds, *zancudo* and *mosco*. They are more common from May to July when there is partial rise in the rivers. Another insect pest in some parts is the blood-sucking *tábano*, which causes swellings and intense irritation.

In the tropical lowland there are two fairly distinct seasons—the rainy period, *invierno*, extending from November to April, and the dry season, *verano*, from May to October, the two intermediate months of either season being one or the other irregularly. The annual precipitation at Iquitos varies up to 100 inches, the greatest rainfall being in March and the least in August. Because of its open nature, the Amazon Valley as far as the Andean foothills is swept by the equatorial east winds rendering comparatively temperate the broad river channels that feel their influence. About the third week in June there is a sudden drop in temperature and this brief spell of "cold" weather is known as *inviernito de San Juan*. During the months from July to September fogs are common, but these disappear soon after daybreak. At this period also sudden rain and wind storms (*turbonadas*), accompanied by lightning, are frequent but these are usually of short duration.

In the upland, around Tarapoto, Lamas, and Moyobamba (alt. 1,400 to 2,700 ft.), the climate is drier than that of the adjacent lowland to the east. Heavy rains are common along the hills surrounding the plain of Tarapoto and the deficiency of rainfall in the plain is compensated by heavy mists and fogs hovering along the slopes and ridges in the early morning. The mean temperature at Tarapoto in the morning registers 72–75° F., but by the middle of afternoon this rises to 90° F. or more. Along the summit of these hills it is much cooler because of a constant strong breeze blowing from the north. Throughout the entire year the upper limit of the montaña is overshadowed by thick mist, rising from streams in the valleys. In the dry season these mists are absorbed by the sun's rays, but in winter they float in thick clouds over the hills and are discharged in endless torrential rains. The alpine air of the puna or jalca is preferred by some natives to the vapory atmosphere of this region.

At Chachapoyas (alt. 7,200 ft.) the annual temperature ranges between 40° and 70° F. The climate here and in the adjacent valleys is salubrious and epidemics are almost unknown. Warm atmospheric currents are frequent in the valleys between Chachapoyas and Molinobamba and these follow chiefly the direction of the Cordillera.

FIG. 9. Plain of Chachapoyas and range of Puma-urcu in the distance (alt. 7,500–9,000 ft.).

INHABITANTS

As the physiographic character of the country is determined by the influence of the high Andean ranges which traverse it, so the lowland and upland zones of the montaña form respectively the abodes of two types of people.

Iquitos, capital of the Department of Loreto, has a population of approximately 12,000, composed in the main of Peruvians of mixed race, a few Chinese, and a sprinkling of Europeans. The total population of the Department, according to the census of 1927, is 150,000 and the majority of the inhabitants belong to the Indian tribes scattered through the territory. A few of the more important tribes are the following: the Aguarunas and Jívaros inhabit the middle Marañón and its affluents; the Conibos of the upper Ucayali are probably an offshoot of the Inca race; the Campas occupy a vast region of the Urubamba and Ucayali rivers and form one of the largest tribes of the upper Amazon basin; the Cocamas inhabit the area surrounding the estuary of the Ucayali River, although scattered groups, living in community houses, are found also above and below Iquitos; the Yahuas form a small, almost extinct tribe inhabiting the village of Pebas, on the lower Peruvian Amazon, and the forest extending towards the Putumayo River; while the Orejones are found in the forests flanking the Napo and its tributaries.

People of pure Spanish blood are relatively few in the upland region for, in the course of time, they have become intermingled with the aborigines and now form the *cholos* or *mestizos*—people of mixed race. Because of the topography and inaccessibility of this region, the cholo of the Department of San Martín is the beast of burden and the state of the trails admits no other means of transportation. These people, hailing mostly from Lamas, and known locally as Lamistos, as well as from numerous villages along the Mayo and upper Huallaga rivers, are accustomed to carry loads of eighty pounds or more on long journeys between Moyobamba, Tarapoto, Yurimaguas, and other points. The population of the Department of San Martín, according to the census of 1927, is estimated at 60,000 and is congregated mostly at Moyobamba, Tarapoto, and Lamas.

The population of the Department of Amazonas is estimated to be approximately 80,000. Most of the people are shepherds or devote their attention to cultivating small patches of land for potatoes, wheat, alfalfa, and other crops which afford them sufficient means for subsistence.

FIG. 10. Climbing La Ventana, on the route from Moyobamba to Chachapoyas (alt. 3,500 ft.).

COMMUNICATIONS

Overland routes.—The montaña possesses no railroad or improved roads. The need of an outlet for the forest resources to the Pacific coast has long been realized but the broken and rugged Andean ranges intervening render the cost of construction prohibitive. A preliminary survey has been made for a proposed trans-Andean railroad from Yurimaguas, through Moyobamba and Jaén to Paita.

There are three principal overland routes between Iquitos and the Pacific coast. The most popular and least hazardous of these is by launch along the Ucayali to Puerto Bermudez, on muleback along the Pichis Trail to La Merced, in the Chanchamayo Valley, from there by automobile to Tarma, thence by train to Lima. The entire distance is about 1,250 miles. The second route is from Yurimaguas to Moyobamba, Chachapoyas, and Cajamarca. The third, least used and most hazardous, is by river launch up the Ucayali River to the junction of the Urubamba and Tambo rivers, along the last-named stream to Puerto Ocopa, followed by a six-day journey through the forest to the nearest station on the southern Peruvian railroad. The entire trip takes from six to eight weeks.

During the last eight years several airplane routes, for passengers and mail, have been established by the government to link Lima with remote centers in the montaña. In January, 1928, a regular air service was inaugurated between Iquitos and San Ramón, in the Chanchamayo Valley, thence by motor and train to Lima. By this means of travel the entire journey between Iquitos and Lima can be accomplished in three days whereas the same journey by water, by mules along the Pichis Trail, and thence by automobile and train, takes from twenty-one to thirty days, depending upon the weather. Another service has been established between Iquitos and Moyobamba, with intermediate stops on the Huallaga and Mayo rivers.

Rivers.—Since there is little overland trading between Iquitos and the Pacific coast, the Amazon River and its tributaries form the most convenient outlet for the forest products. The total aggregate navigable length of the main stream and its numerous affluents within Peruvian territory for craft, ranging from canoes to ocean-going steamers, may be estimated to be about 12,000 miles during the rainy season. Of course, navigation in certain places on these rivers depends upon the rise and fall of the water according to the seasons.

FIG. 11. One of the series of rapids between Shapaja and Chasuta, middle Huallaga (alt. 1,000 ft.).

The tributaries of the Amazon within the montaña may be divided into two main groups. One series, principal of which are the Marañón, Huallaga, and Ucayali, have their sources in the Andean highlands of central and southern Peru and flow in a northern or northwesterly to northeasterly direction. Along the tablelands feeding these rivers, the rainy season commences about September and the highest waters reach the Amazon towards the end of February or beginning of March. Another group of affluents, of which the chief are the Morona, Pastasa, Tigre, Nanay, and Napo, have a general southeasterly course. The wet season in the northern Cordilleras begins in February and these rivers carry down the floods, attaining their greatest rise in June, by which time the southern tributaries have receded. In this manner only one set of affluents is flooded at a time. At Iquitos the difference between low-water and high-water mark varies between thirty and forty feet.

On the Amazon and its main tributaries, ocean-steamers, with a tonnage up to 4,000, are able to proceed at high water as far as Iquitos. A regular weekly service is operated by the Amazon River Navigation Company (Ltd.) between Iquitos, Manáos, and Pará, and connects with steamers for the United States and Europe. Fortnightly sailings are made by launches operated by local enterprises between Iquitos and Yurimaguas. Smaller launches ply between the town and points on the Marañón, middle and upper Ucayali, Napo, Javary, and Putumayo rivers.

AGRICULTURE

The agricultural crops grown in the montaña range between those of the tropics and the temperate zone. At higher altitudes, in the Department of Amazonas, for example, this variation may be found within a limited area. Notwithstanding the diversity of crops and altitude there is no marked division into agricultural belts. It is true that some crops are confined to the higher elevations, others to the lowland, but between these there is an overlapping with intermediate crops. The native population throughout this extensive region is essentially agricultural, but for want of wealth the industry is still in its infancy, especially in the tropical lowland.

With the exception of the cultivation of sugar cane, agriculture as practised in the Department of Loreto is still of a primitive character. Within the last few years, however, there have been definite signs of improvement in the methods, which can be attributed in part to the decline of the rubber industry. In reference to the area of

cultivated and uncultivated land in the department the following statistics were furnished by the Consul General of Peru in New York:

	Acres
Cultivated land (in Loreto)	13,500
Uncultivated but tillable land	263,200
Not cultivable	185,800
Total	462,500

Of field crops the most important are maize or corn, beans (*Phaseolus*), rice, cassava (*Manihot*), sweet potatoes (*Ipomoea Batatas* Poir.), and plantains (*Musa paradisiaca* L.). Cassava and plantains are essentially the staple food of the people and are cultivated in small pieces of land, *chácaras*. According to the primitive system followed, the land is not continuously or permanently occupied. The simplest form of preparing land for tillage is to burn a small area of forest growth without resorting to cutting. An alternative method is to clear a forest area by simply felling the trees. This is done in humid regions where the trees do not become sufficiently dry to burn. The humus layer remains undestroyed and the roots left in the ground prevent erosion. A great portion of the vegetation survives cutting and when cultivation is abandoned it serves to begin the process of reforestation.

In some areas agriculture of a more advanced form is practised and the excellent crops produced indicate the fertility of the land. At La Victoria, near the Peruvian-Brazilian border, there is a 1,500-acre sugar cane plantation. Another plantation is located at Puerto Arturo, a short distance below Yurimaguas on the Huallaga River, and several others are along the lower Ucayali. The total production of cane sugar in 1929 was estimated to be 28,704 metric tons. Rice is grown on a small scale in the upper reaches of the Napo River and the output for 1929 was estimated at 678 tons. A good quality of cotton, of the Sea Island variety, is grown in the Ucayali basin.

Of late years much interest has been taken in the cultivation of coffee and the bulk of the annual yield is exported to Europe. In 1930 exports of coffee from Peru amounted to 710 tons; in 1931, 2,076 tons; and in 1932, 2,421 tons. In addition, there has been a progressive interest in the growing of fruit trees such as cacao, mango, lemon, and avocado.

In the upland of San Martín and Amazonas the land is very fertile, but the rocky nature of these regions, together with lack of navigable rivers, suitable roads, and beasts of burden, has hampered

the development of these healthy and fertile centers. In addition to plantains, yuca or cassava, and peanuts for local consumption, the principal crops grown on the plain of Tarapoto are tobacco, cotton, coffee, and small patches of coca. In the vicinity of Morales, a small village not far from Tarapoto, there are numerous small tobacco plantations and almost the entire annual crop is shipped to Iquitos and the Pacific coast. Rumisapa, a village almost halfway between Tarapoto and Lamas, is now noted throughout northern Peru for the fine quality of coffee grown there. The town of Moyobamba is located in the midst of a fertile territory with an agreeable climate and has, indeed, the natural endowment of a great agricultural center, but here, as elsewhere in the montaña, means of communication are an indispensable prerequisite. The population of that town is less today than it was twenty years ago, and is still decreasing. During the rubber boom a great number of men migrated to the forests of the Ucayali, Napo, Purus, and Putumayo.

At Molinobamba and in the direction of Chachapoyas the people are engaged in raising cattle and grazing sheep, and in the cultivation of potatoes. In sheltered spots alfalfa and wheat flourish, but the cost of transport on muleback to the coast or by water to Iquitos precludes any outside market. The Peruvian cholo has always been a small landed proprietor for in former times every inhabitant was assigned by the government a certain area of land which he was obliged to cultivate, receiving in return for his labor one-third of the produce. Today, however, there is no such restriction imposed upon him except a nominal tax, and he cultivates little more than is sufficient for his immediate needs.

FOREST PRODUCTS

Peru has no forest service or equivalent organization to encourage the study or to control the exploitation of her forest resources. An executive decree of 1908 prohibits the cutting of trees in public places except by permission granted by local officials of the Department of Fomento, and requires that two trees shall be planted for each one cut. The forests contain a wide variety of woods, ranging from light and soft to exceedingly heavy and hard, and of present or potential commercial value. The local demand for timber is small and limited to such purposes as dugout canoes, where convenient size and ease of working are the principal requisites, for house posts and rollers for crushing sugar cane, which must be strong and durable, for furniture, general carpentry, and rough uses, while

a great number of plants are in demand on account of their economic value.

The exploitation of certain timbers, while not of large magnitude in relation to the extent of the forests, is progressing slowly, although handicapped by the isolation of the territory, the high freight rates, and, unlike the conditions prevailing in some other tropical countries, the great distances that have to be traversed within the montaña before finding timbers suitable for market. In some instances, logs have to be floated for several hundred miles to the shipping point.

In the following pages are discussed the more important economic products of the montaña. The statistics of exports from Iquitos were furnished by the Pan American Union, Washington, D.C.

MAHOGANY

From a commercial standpoint, mahogany is the most valuable tree found in the forests of northeastern Peru. The trees grow at altitudes of from 400 to 3,400 feet and appear to be limited to a belt, of varying width, extending from southern Ecuador to the headwaters of the Tambo and Urubamba rivers, both affluents of the Ucayali.

In the lowland the trees are found in low-lying regions adjacent to streams, in swamps, or where the forest is subject to inundations, but they attain their best development in dense forest growth on slight elevations with dry, firm soil, away from watercourses. In the upland forests, of the Huallaga and Mayo rivers, for example, where the altitude ranges between 900 and 3,500 feet, the trees are found in dry regions and are usually smaller, while the wood is slightly lighter in color and heavier, is less susceptible to damage by insects, and appears to be of better quality than that of the lowland. No mahogany trees were seen between the Nanay River and the Peruvian-Brazilian border and they do not appear to grow west of Moyobamba, in the Department of San Martín.

In the neighborhood of towns and villages along the banks of the Amazon and its tributaries, the timber has been employed over a long period for domestic uses, so that mahogany trees are now found in that region only at great distances apart. Remote territories in which mahogany trees grow are continually being found, and in these unexpected and unexploited areas the occurrence of the trees may be estimated to be one tree in every two or three acres. Other sparsely settled regions are known to be rich in mahogany, but the means of communication are so precarious, owing to rapids, whirl-

pools, and strong currents, that no practical attempts have so far been made to exploit the timber in those areas.

The first attempt to exploit mahogany on a commercial scale was made by the Aguna Mahogany and Timber Company of Boston, Massachusetts. Concerning this, Mr. Georges H. Barrel, formerly associated with that concern, writes: "A number of years ago Mr. Arthur Rushforth of Liverpool, England, informed me of having seen on a deck in New York some logs consigned as 'South American hardwood.' Mr. Rushforth was of the opinion that these were mahogany logs. Samples of these were examined subsequently by Professor Record and found to be a species of *Swietenia*.

"I therefore entered in relation with some firms in Iquitos and received in due time a few boards labeled 'aguano de altura' and 'andiroba.' " Soon afterwards twenty logs were bought from Cecilio Hernández y Hijos of Iquitos. During the period 1920–24 it is estimated that at least 2,000 logs, or approximately 500,000 log feet, of mahogany were shipped. In 1925 the S.S. *Omega* made two voyages to Iquitos and brought back 4,000 logs.

EXPORTS OF MAHOGANY FROM PERU

	1927		1928		1929	
Destination	Tons	Value	Tons	Value	Tons	Value
United States	2,070	$32,908	1,745	$19,588	13,548	$208,768
Brazil	560	9,428	179	1,973	178	2,876
United Kingdom	110	2,175	529	5,367	81	2,288
France	.....	.....	160	1,274	103	1,948
Spain	.....	.....	2	71	19	560
Netherlands	.....	.....	.....	.....	22	356
Germany	57	1,263	632	14,280	.....	.....
Portugal	3	60	.....	.....	.....	.....
Total	2,800	$45,834	3,247	$42,553	13,951	$216,796

Note: A ton=1,000 kilos (2,200 lb.). Values are in dollars (U.S.A.) computed at the following rates of exchange for the Peruvian pound: 1927, $3.737; 1928, $3.97; 1929, $4.00.

In 1926 a band-mill, known as the Nanay Mills (Aguna), Ltd., was built at the mouth of the Nanay River, six miles below Iquitos. The outlet of a small stream, close to the mill, was dammed to form a log pond with a minimum capacity of 10,000 logs. In 1928 the Aguna Mahogany and Timber Company suspended operations and was succeeded by the Astoria Manufacturing and Importing Company, Inc. During the three years, 1926–28, the production rose to from 1,000,000 to 2,000,000 log feet, while during the logging seasons of 1929–30 and 1930–31 the total output amounted to 6,000,000 log feet per annum. Each tree yields an average of two logs and each log contains approximately 400 board feet of lumber.

Courtesy of I. T. Williams & Sons

FIG. 12. Rafts of mahogany logs at Nanay mills.

The principal area where cutting is now being done is the central part of the montaña, in the basins of the Ucayali and Huallaga rivers. The logs are rafted downstream, often for considerable distances, to the Nanay mills, either to be sawed or to be shipped to the United States and Europe. Several thousand acres of concessions, in which mahogany trees grow, have also been granted by the Peruvian government along the Tigre, Pastasa, and Morona rivers. A few of the foreign concerns located in Iquitos also do some cutting on a small scale.

A species of mahogany, resembling the Peruvian and probably of the same species, although described by Gleason as a new species, *Swietenia Krukovii*, grows in the upper reaches of the Jurua and Purus rivers. The logs are floated down these rivers as far as Manáos, where, as in Peru, they are sold under the name "aguano." According to a reliable exporter in Manáos, it is possible to develop in this region a steady supply for several years of from 1,500 to 2,000 logs annually.

A serious injury of frequent occurrence in Peruvian mahogany logs is caused by a species of *Platypus* belonging to the class of beetles that usually cause pinhole defect in lumber. The female insect bores through the bark while the wood is still green or wet and deposits eggs beneath the bark, from which the larvae emerge and later pupate within the wood. The holes are small and round. The borer feeds not on the wood but on the ambrosia fungus, the spores of which are carried on the body of the female insect. This fungus growth causes a bluish gray stain extending along the sides of the pinholes. Timber is attacked immediately after or within a few weeks of felling. Butt logs often show a large number of pinholes, whereas relatively small logs, cut from the upper part of the bole, do not appear to be so heavily infested.

Peruvian mahogany trees are susceptible also to the attacks of spotworm, the larva of an undetermined beetle, which attacks standing trees. The tunnels are a quarter inch or more in width, may penetrate to a depth of several inches, and may be straight or U-shaped. Spotworm holes are found in the heart of mahogany logs and damage trees of all sizes, including saplings. In some instances the insects return year after year so that a dozen tunnels, formed at different periods, may be seen within a square foot of lumber. Incident to the damage caused by the spotworms, a certain amount of decay develops in the surrounding wood and stained red spots and streaks several inches long may be found. The wood

Courtesy of I. T. Williams & Sons

FIG. 13. Nanay mills, near Iquitos, showing the log haul-up.

emits a gum as a healing fluid, which fills the worm holes as a sticky, red liquid which coagulates and dries, giving the gum-filled worm holes the appearance of pin-knots.

CEDAR

Spanish cedar (*Cedrela odorata* L.) or "cedro colorado," as it is known in Spanish America, is a very common tree in the montaña, growing in both flood-free and inundated forest, usually in conjunction with mahogany, to which it is closely related. Its timber is more widely employed locally than any other species, being adapted to a wide range of uses. It is pale reddish brown or pinkish, durable, highly fragrant, easily worked, finishes smoothly, holds its place, and is employed locally for furniture, dugout canoes, crates, box shooks, and general carpentry. Along the Huallaga, Ucayali, and other tributaries of the Amazon, the loggers fell the trees near the rivers and raft the logs to the mills near Iquitos to be sawed into lumber or for export. The logs are well formed and of good appearance. Shipments of Peruvian cedar from Iquitos to the United States and Europe are of regular occurrence.

EXPORTS OF CEDAR FROM IQUITOS

	1932		1933		1934	
Destination	Tons	Value	Tons	Value	Sq. Ft.	Value
United States	307	$2,273.88	102	$ 950.00	81,346	$1,139.00
Great Britain	48	392.56	37	347.00	100,167	1,402.00
Spain	...	.....	...	.....	11,373	159.00
Italy	...	.....	...	.....	1,608	23.00
Total	355	$2,666.44	139	$1,297.00	194,494	$2,723.00

Note: The foregoing figures were taken from *Annuario del Commercio Exterior del Peru* for 1932, 1933, and 1934.

"Cedro blanco" or white cedar (*Cedrela fissilis* Vell.) is a medium-sized tree of limited distribution, growing usually in the uplands. Its wood is light or moderately light in weight and ranks in this respect with our native butternut, cottonwood, and yellow poplar. The heartwood is plain reddish brown, straight-grained, but does not bear the various types of figure obtained in mahogany. Its principal local use is for general carpentry.

Herrera (Revista Sudamericana de Botanica 1: 21–27. Feb. 1934) states that another species of cedar, *C. Herrerae* Harms, forms extensive forests in the Department of Cuzco, in the Urubamba Valley, and is also cultivated commonly at altitudes from 9,100 to 11,500 feet. He describes the tree as of slow growth, flowering at fifteen years or more. Two forms of the tree are recognized locally,

but both forms probably represent a single species: "atoc-cedro," which attains a height of 45 to 60 feet, with a white, porous, fibrous wood and with but slight odor, growing in the bottoms of ravines and along streams; and "cedro-virgen," from 80 to 95 feet tall, with reddish, compact, very resinous wood, with a pungent odor, growing on hillsides. From the former are obtained planks 12 or 15 feet long; from the latter, which is more highly valued, the planks range from 23 to 26 feet in length. The timber is light in weight, easy to work, and incorruptible. It is used for fine furniture.

WALNUT

The principal as well as the most esteemed timber tree found in the vicinity of Chachapoyas and adjacent regions in the Department of Amazonas is a species of walnut (*Juglans neotropica* Diels), known locally as "nogal." The trees are scattered in ravines and valleys at elevations from 5,800 to 7,200 feet, and at lower altitudes along the banks of the Utcubamba River, a tributary of the upper Marañón. Its wood is used locally for furniture, cabinet-making, and musical instruments.

Because of the remoteness of the territory and physiographic obstacles, exploitation of this useful timber is handicapped. One method of extraction is to raft the logs to Iquitos, but a series of turbulent rapids, like the Pongo de Manserriche, must be negotiated in the Marañón. Another means is to transport small lots on pack mules over the western Cordillera of the Andes to Celendín, a six days' journey, and afterwards by road and railroad to Pacasmayo, the nearest port on the Pacific coast. The entire distance from Chachapoyas to Pacasmayo is approximately 210 miles.

According to Mr. Georges H. Barrel (Trop. Woods 10: 51. 1927), walnut is found on the Andean slopes bordering the upper reaches of the Ucayali River, and large trees grow also in abundance in the Chanchamayo Valley and along the Pichis Trail, the principal overland route between Iquitos and Lima. "I had occasion," writes Mr. Barrel, "to cross overland by the Pichis Trail from the Azupizú River to the Chanchamayo Valley and thus to make a first-hand study of the timber resources of that region. . . . I venture the opinion that there are several varieties of walnut in that region. Two local names given by the Indian intelligentsia were 'nogal blanco' and 'nogal negro' (white walnut and black walnut), thus differentiating at least two subspecies. Many trees were well over 36 inches in diameter, not a few very large, straight, and free from

lateral branches for a considerable height. No less than thirty trees were counted along the trail within a few hundred yards. Their distribution is very erratic. On some slopes walnut is decidedly abundant, on others rare, on still others totally wanting.

"Although, as a whole, large walnut trees are abundant, logging them seems impossible in view of the topography of that remote land. While the vast net of streams furrowing through these immense forests is part of the big Amazon drainage, yet hundreds of miles of rapids have to be negotiated before reaching rivers of sufficient depth and subdued turbulence to permit rafting. The Pacific Ocean, it is true, is only 300 miles away, but access to it is impeded by that most formidable of barriers, the Cordillera of the Andes, up to 20,000 feet or more in altitude."

RUBBER

There was little commercial interest in rubber in the montaña until about the beginning of the present century. Owing to increasing demand for the commodity, rubber-gathering in Brazil was thrust farther and farther west until it reached the upper Amazon tributaries, such as the Javary, Napo, Huallaga, and Ucayali. During the period 1906–1912, when the industry reached its zenith in the Amazon Valley, the annual export from northeastern Peru averaged from 2,000 to 2,500 tons, most of which was shipped from Iquitos. After 1912 the production of rubber from trees grown in plantations in the East Indies began to exceed the total output of the Amazon Valley, but during 1919–20 exports from the Peruvian montaña again reached the old level. After this brief recovery, however, they gradually declined until in 1928 the total value of rubber exported from Iquitos did not exceed $50,000.

EXPORTS OF RUBBER FROM THE MONTANA

	1930		1931		1932	
Destination	Tons	Value	Tons	Value	Tons	Value
United Kingdom	26	$ 6,233	22	$ 6,653	22	$2,664
Germany	46	11,760	10	2,333	7	766
United States	55	15,520	5	1,750	..	.....
Total	127	$33,513	37	$10,736	29	$3,430

Like other species, rubber trees are not distributed uniformly throughout the lowland forests and are rarely found in any extensive stands. In some regions, the Javary and upper Nanay, for example, they are more common than other species and usually are found in swampy areas or on slightly undulating land. Three species of rubber-yielding trees are recognized by the natives: "siringa mapa,"

FIG. 14. Small Pará rubber plantation, lower Peruvian Amazon.

"jebe fino," or "jebe débil muerto" (*Hevea brasiliensis* and *H. brasiliensis* var. *janeirensis*); "siringa" (*H. membranacea* and *H. microphylla*); and "caucho" (*Castilla Ulei*). The last named furnishes a latex inferior in quality to that of *Hevea* and is tapped by felling the trees and making incisions in the bark.

The season for tapping latex commences in November or December and lasts through May or June, but the best flowing period varies with local conditions. Having selected his trees, the "cauchero" proceeds at daybreak to tap the trees by making incisions in the bark with a bush-knife, *machete*, or with a special implement with a hook, known as *rasqueta*. There are several methods of tapping, such as making oblique grooves leading into a central one in herringbone arrangement, by cutting channels around the trunk, or by making simple cuts as shown in figure 14. The latex exuding from the incisions is collected in tin cups placed below the cuts. Around noon the latex obtained from several trees is poured into an empty kerosene can and taken to camp. The quantity tapped from each tree varies with its age and condition but an average yield would amount to about half a gallon for the tapping season and a tree may furnish latex for twenty years or more. Trunks of old trees become scarred from successive tappings and cuts must be made farther up the bole.

The latex is cured at the central camp. Two posts, set six or eight feet apart, support a horizontal pole and, underneath, a fire of palm nuts and leaves is kindled. The latex is poured on the horizontal pole, which is continually revolved, and on contact with heat the latex coagulates readily, additional milk being added until a ball or "loaf" of rubber, one foot or more in diameter and weighing upwards of ten pounds, is formed. The "loaves" are transported from the central camp to the nearest river landing, loaded on canoe or raft, and floated to a point where the cargo is transferred to a river launch for shipment to Iquitos.

BALATA

As already observed, many of the rubber gatherers in the montaña are now unable to eke a livelihood because of the low prices obtained for rubber and their inability to compete with the product produced in scientifically managed plantations in the Far East, where labor is cheaper. Consequently, some of these people have turned their attention to collecting balata. In 1919 exports of this commodity from Iquitos amounted to 3,000 pounds' weight, but by 1929 this had increased to well over 1,000,000 pounds.

The most important areas where balata trees grow are the basins of the Putumayo, Marañón, Napo, Ucayali, Nanay, Huallaga, and Amazon. The trees are scattered through the forest, but nowhere are they found in any extensive stands. The natives distinguish three varieties of balata-yielding trees, all of the genus *Manilkara:* "balata quebradiza" or "balata rosada," so-called because of the tendency of the latex to turn pink on exposure to air and sunlight; "balata blanca de altura;" and "balata mapa" or "balata zapotina."

EXPORTS OF BALATA FROM IQUITOS

	1930		1931		1932	
Destination	Tons	Value	Tons	Value	Tons	Value
United States	340	$ 98,339	366	$127,324	71	$20,534
France	178	40,885	28	10,735	48	10,426
United Kingdom	82	22,975	24	6,066	12	2,921
Germany	4	1,332	36	10,936	7	1,289
Total	604	$163,531	454	$155,061	138	$35,170

Unfortunately, the prevailing method of felling the trees for tapping destroys future supply. After the tree is felled the bleeder cuts incisions about one-half inch deep, from one and a half to two feet apart, and around the trunk. The latex exuding from the channels is collected in calabash bowls or other utensils. The milk gathered from several trees is poured into kerosene tins and transported to the central camp. The latex is then poured into shallow trays and exposed to the sun and air to dry.

The more common and rapid process is to coagulate the latex in the smoke of a fire and then run it into rectangular molds. In this manner the balata becomes dark bluish gray or black in color, and the rectangular blocks, *planchas*, weighing about eleven pounds, are kept immersed in water for preservation until they may be shipped by canoe or launch to Iquitos. Frequently, the latex of other trees is tapped, especially of "naranjo-podrido" (*Parahancornia Amapa*), and used for adulterating the balata. This is claimed to improve its consistency.

TAGUA OR VEGETABLE IVORY

Vegetable ivory is obtained from the fruit of the tagua palm (*Phytelephas* sp.), common throughout the lowland and in parts of the upland, usually in swampy patches or in the vicinity of streams. The palm is low in growth, seldom attaining a height of more than twenty-five feet, and with large, feather-like leaves. The trunk is very short, stout, and marked by scars left by fallen leaves.

The staminate palm bears no fruit and its leaves extend from the base upward. The flowers of the pistillate palm are slightly fragrant

and are situated at the base of the lower leaves, at which point the round clusters of tagua nuts appear later.

In the early stages of formation the kernel of the seed is soft, sweet, and edible, but when ripe it is hard, white, and fine-grained. Tagua palm bears fruit at all seasons of the year and there is no special harvest period. During the dry season the natives pick the seeds from the ground when the fruits split and fall apart at maturity. The number of fruits depends upon the age and condition of the trees, but from ten to fifteen per tree would be a conservative average and as many seeds within each fruit.

EXPORTS OF TAGUA FROM IQUITOS

	1930		1931		1932	
Destination	Tons	Value	Tons	Value	Tons	Value
Brazil.....	81	$ 884	753	$ 7,255	999	$ 9,382
France.....	747	10,840	147	1,413	233	2,265
Portugal.....	232	3,567	146	2,070	209	2,131
Total.....	1,060	$15,291	1,046	$10,738	1,441	$13,778

The thoroughly dried seed can be sawed, carved, or polished, and readily absorbs coloring matter. The product is used for the manufacture of buttons, dice, ornaments, and other articles.

COCA

One of the most interesting shrubs peculiar to the foothills of the eastern and central Cordilleras of the Andes is coca (*Erythroxylon Coca*), from the leaves of which the alkaloid, cocaine, is obtained. The original home of the coca plant includes chiefly the Andean regions of Colombia, Ecuador, Peru, and Bolivia. This is one of the chief products of the Sierras and in some regions the coca plantations, *cocales*, form a profitable industry.

Cultivation of the shrub is best carried out in the warm valleys of the eastern foothills and along their slopes where there is a certain amount of precipitation throughout the year. Beginning in the low tropical forest, coca shrubs, cultivated in small or fairly large clearings, are found at altitudes up to 6,000 feet or more. The seeds are sown in December and January and the seedlings are transplanted in the following year. When fully grown the shrub measures from four to six feet in height and may be productive for several years. The leaves are picked, sun dried, and packed in bales. Transportation of coca leaves from the plantations to the coast is slow and expensive, for the product must be carried on the backs of natives, mules, or llamas over long and rough trails. Since the bulk of the

annual crop is consumed by the native laborers of the upland, only a small percentage of it is exported.

EXPORTS OF COCA LEAVES FROM PERU

Destination	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
United States	105	$21,293	137	$27,606	70	$14,004
France	17	7,742	12	2,817	15	2,666
Germany	25	7,820	17	3,484	12	1,947
Chile	32	15,213	3	767	..	.....
Total	179	$52,068	169	$34,674	97	$18,617

CUBE-BARBASCO

Several species of trees, shrubs, and herbs of common occurrence in the montaña contain substances suitable for use by the natives as fish poisons. Among these may be mentioned the irritating latex from the incised bark and sapwood of "catahua," *Hura crepitans* L.; the ground leaves, and often the whole plant, of *Tephrosia, Jacquinia,* and *Serjania;* the fruit of *Gustavia;* leaves and fruit of *Thevetia peruviana* (Pers.) K. Schum. and *Clibadium silvestre* (Aubl.) Baill.; and the fruit of *Randia spinosa* (Jacq.) Karst. But the one regarded as the most powerful and most generally used by the natives of the montaña is *Lonchocarpus Nicou* (Aubl.) DC., an evergreen leguminous shrub which has recently attracted attention due to its active crystalline principle, rotenone, of value in the manufacture of insecticides. (For further notes see page 215.) The roots, measuring in old plants up to 10 feet or more in length, contain a large quantity of milky latex of a highly poisonous nature. Its use as a fish poison is prohibited by law, but in little-known forest regions, far removed from administrative authorities, it has been found difficult to eradicate this primitive custom.

This scandent shrub is commonly known as barbasco, a general term in Hispanic America for plant fish poisons, but other vernacular names are applied to it in various localities of northeastern Peru, namely, "barbasco legítimo," "huasca-barbasco," "sacha-barbasco," and "rumu barbasco." Along the Ucayali River and adjacent territories the terms "coñapi" or "coñape" are in use, while in the highlands in the central region of the Republic, the shrub is variously known as "cube," "cume," or "cubi."

The shrub is encountered in northeastern Peru at altitudes ranging from 400 to 3,000 feet or more, in thickets, deserted overgrown clearings, and, less frequently, in dense forest growth, generally close to the margin. For propagation it thrives best in open, sandy

or medium loam, not subject to seasonal inundations. In the lowland it is planted rather abundantly for use as fish poison in the vicinity of Iquitos, also at Yurimaguas, above the confluence of the Paranapura with the Huallaga River, while in the upland of San Martín, Tarapoto is the center of its propagation, where it is grown on small patches of cleared land mostly on hillslopes surrounding the town. It is propagated by cutting a piece of the main trunk and planting it in the soil a few inches below the surface.

For several years an intensive search has been conducted for new insecticides of plant origin. McIndoo and Sievers (U. S. Dept. Agr. Dept. Bull. 1201, p. 54, Mar. 19, 1924) state that of 260 specimens of plants investigated for this purpose "only about 5 per cent furnish material for efficient insecticides, and of these only about half may be regarded as satisfactorily efficient. Among the latter is *Lonchocarpus Nicou* (Aubl.) DC. Extracts of this, combined with soap, proved to be promising contact insecticides. . . ." It appears that the use of "cube-barbasco" as a vermifuge and insecticide has been registered in the United States Patent Office (U. S. No. 1621240).

Samples of cube-barbasco roots collected by the writer were submitted to Howard A. Jones, Bureau of Chemistry and Soils, United States Department of Agriculture, for chemical analysis. Using the carbon tetrachloride method of extraction, he found that the rotenone content of air-dried material submitted by Field Museum was 6.8 per cent and total extract 20 per cent (see Journ. Wash. Acad. Sci. 23. No. 1: 36–45. 1933).

Furthermore, he reports that of 23 samples of "cube" or "barbasco" root tested the rotenone content ranged from less than 1 to about 11 per cent, whereas that of 45 samples of derris root ranged from none to about 7 per cent. The average of 22 samples of "barbasco" root analyzed by the carbon tetrachloride method was 5.4 per cent rotenone, and the average for 31 samples of derris root was 2.5 per cent.

Other chemists have found that rotenone is a white crystalline compound having the formula $C_{23}H_{22}O_6$. It is insoluble in water, but soluble in chloroform, alcohol, and other organic solvents. Rotenone is extremely toxic to fish, 1 part in 20,000,000 parts of water being sufficient to kill goldfish in three hours. It is also highly poisonous to insects and is effective both as a contact and as a stomach insecticide. Apparently, judging from many investigations, it has no effect on human beings either when taken by mouth, dust-

ing, or by intravenous injections. These results indicate the suitability of cube-barbasco roots as a source of this valuable insecticide principle and the desirability of more extensive cultivation of the species.

The statistics of shipments from Iquitos show that in 1931 approximately 1.5 tons were exported; 1932, 8.5 tons; 1933, 14.5 tons; 1934, 245 tons; and during the first half of 1935, 400 tons.

OTHER FOREST PRODUCTS MOSTLY OF LOCAL VALUE

TIMBERS FOR CARPENTRY, JOINERY, AND GENERAL CONSTRUCTION

Name	Uses
Aniba spp. (Moena)	General carpentry.
Aspidosperma subincanum (Pinshi caspi, Quillo bordon)	General carpentry, furniture.
Byrsonima spicata (Indano)	General carpentry, door frames.
Calophyllum brasiliense (Lagarto caspi)	House beams, flooring, joinery.
Calycophyllum Spruceanum (Capirona)	Furniture, general construction, more especially firewood for launches.
Carapa sp. (Andiroba)	House beams, joinery.
Caryocar spp. (Almendro)	House beams and posts; nuts with edible kernel.
Casearia spp.	House construction, furniture.
Chimarrhis Williamsii (Tuwarra, Yaco caspi)	General carpentry.
Chlorophora tinctoria (Insira, Limulana)	Heartwood for furniture, general carpentry; yields a dye.
Clarisia nitida (Capinuri, Guariúba)	General carpentry.
Cordia alliodora	Lining of furniture.
Coussarea hirticalyx	Rough carpentry.
Coutarea hexandra (Huacamayo caspi)	Furniture.
Crataeva Tapia (Nina caspi, Palo de candela, Tamara)	Rough carpentry.
Duroia longifolia (Pampa remo caspi)	General carpentry.
Endlicheria Williamsii (Isma moena, Moena blanca)	Furniture, crating.
Guazuma ulmifolia (Lluicho vainilla, Iumanasi)	Carpentry, joinery.
Hura crepitans (Catahua)	General carpentry, crating.
Isertia hypoleuca (Asar quiro)	General carpentry.

Name	Uses
Ixora Killipii (Chimicua)	General carpentry, house construction
Leonia glycycarpa (Nina caspi, Urcu tamara)	General carpentry, house construction.
Lucuma dolichophylla (Quina-quina)	General carpentry, house construction.
Miconia spp. (Rifari)	General construction, carpentry.
Nectandra Pichurim (Moena)	Doors and door frames.
Ocotea opifera (Moena blanca)	Flooring, house construction.
Ocotea tarapotana (Moena aguaras, Canela moena, Turpentina moena)	Door frames, flooring.
Ogcodeia Ulei	General carpentry.
Phoebe pichisensis	General carpentry.
Pithecolobium Mathewsii (Algarrobo)	General carpentry.
Pithecolobium Saman (Huacamayo chico)	Rough carpentry, joinery.
Poraqueiba sericea (Umarí)	Interior construction.
Sickingia spp. (Puca quiro)	Furniture.
Symphonia globulifera (Brea caspi)	Carpentry, furniture.
Tapirira guianensis (Isaparitsi)	Interior trim.
Trichilia tocacheana (Lupuna, Rifari)	General construction.
Trichilia Uleana	General construction.
Trichilia Williamsii	General construction.
Xylopia spp.	House frames.
Zanthoxylum spp.	General carpentry, furniture.

TIMBERS FOR HOUSE POSTS, PILING, AND ROLLERS FOR CRUSHING SUGAR CANE

Name	Uses
Caryocar spp. (Almendro)	House posts.
Carpotroche parvifolia (Casha huayo)	Piling, house beams.
Cordia alliodora	Piling.
Coutarea hexandra (Huacamayo caspi)	House posts.
Dialium acuminatum (Huitillo)	House and fence posts.
Duroia hirsuta (Supai quinilla)	Piling.
Erythroxylon spp.	House and fence posts.
Lindackeria maynensis (Huacapu, Lluicho caspi, Quinilla colorada)	House posts.

Name	Uses
Lucuma Caimito (Caimito)	House posts and beams.
Lucuma huallagae (Huangana caspi)	House posts.
Manilkara bidentata (Pamashto, Quinilla)	Piling.
Miconia dichrophylla (Caracha caspi)	Piling.
Miconia parviflora (Sinchi mullaca)	Piling.
Myroxylon balsamum (Estoraque)	Rollers for crushing sugar cane.
Ocotea tarapotana (Moena aguaras, Canela moena, Turpentina moena)	Piling.
Pithecolobium Mathewsii (Algarrobo)	House posts.
Roupala Dielsii	House posts.
Sclerolobium sp. (Ucsha quiro)	House posts.
Swartzia myrtiflora (Shatona blanca)	Rollers for crushing sugar cane.
Symphonia globulifera (Brea caspi)	House posts.
Tabebuia (*Tecoma*) sp. (Tahuari)	Rollers for crushing sugar cane, piling.
Tachigalia paniculata (Caracha caspi, Erpes)	Piling.
Terminalia spp. (Rifari, Shapana)	Piling, rollers for crushing sugar cane.
Vitex sp.	Piling.

TIMBERS FOR CANOES AND RAFTS

Name	Uses
Anonocarpus amazonicus (Mashunasti)	Dugout canoes.
Calophyllum brasiliense (Lagarto caspi)	Dugout canoes, also for joinery, house beams and flooring.
Clarisia nitida (Capinuri, Guariúba)	Canoes.
Endlicheria Williamsii (Isma moena, Moena blanca)	Canoes.
Manilkara bidentata (Pamashto, Quinilla)	Canoes.
Ochroma boliviana (Palo de balsa)	Rafts.
Symphonia globulifera (Brea caspi)	Boat keels.

SPECIAL APPLICATIONS

Name	Uses
Ajouca Jelskii (Moena del agua)	Crates, sugar boxes.
Astronium spp. (Palo de cruz)	Walking sticks.

Name	Uses
Banara guianensis (Machin-mangua, Raya-caspi)	Sugar boxes, crates.
Bombax spp. (Huimba caspi, Punga)	Bark for cordage; silk cotton fiber from fruits for stuffing pillows, mattresses, etc.
Carludovica palmata (Bombonaje)	Fiber from young leaves for the manufacture of "Panama" hats.
Cecropia spp. (Setico)	Inner bark for cordage.
Cinchona spp. (Quin-quina)	Quinine from bark.
Clibadium remotiflorum (Huaca, Llama huasca)	Crushed leaves used as fish poison.
Cochlospermum spp. (Huimba, Huina caspi)	Silk cotton from fruits.
Duroia longifolia (Pampa remo caspi)	Canoe paddles.
Genipa americana (Jagua, Yaco huito)	Fruit yields a blue-black dye used by the Indians for painting their bodies; timber for boxes, chests, and barrel hoops.
Guarea trichilioides (Latapi)	Cooperage.
Guazuma crinita (Bolaina)	Boxes, crating.
Guazuma ulmifolia (Lluicho vainilla, Iumanasi)	Inner bark for cordage; tool handles.
Jacaranda sp. (Ishpingo)	Boxes, crates, barrels.
Lonchocarpus Nicou (Cube-barbasco)	Crushed roots used as fish poison; contain rotenone, an ingredient of insecticides.
Lucuma bifera (Pucuna caspi, Urcu cumala)	Blowpipes.
Lucuma Caimito (Caimito)	Tool handles; fruit edible.
Mauritia flexuosa (Aguaje)	Fiber from young leaves for hammocks; leaves for thatch.
Muntingia Calabura (Iumanasa)	Rafting poles.
Pithecolobium laetum (Remo caspi)	Canoe paddles, tool handles.
Salix chilensis (Pajarobobo, Sauce)	Twigs for basketry; inner bark for cordage.
Sickingia spp. (Puca quiro)	Spoons, utensils.
Tabebuia (*Tecoma*) sp. (Tahuari)	Handles for bush knives, blowpipes.
Trema micrantha (Atadejo)	Bark for cordage.
Trophis racemosa	Leaves for fodder.
Xylopia spp.	Fish spears, canoe and raft poles.

LATEX- OR RESIN-YIELDING TREES

Name	Uses
Copaifera reticulata (Copaiba)	Copaiba balsam, used locally for anointing the hair and medicinally.
Couma spp. (Leche caspi)	Latex similar to chicle, for calking canoes and launches.
Castilla Ulei (Caucho negro)	Caucho rubber.
Lucuma spp.	For adulterating balata.
Manilkara bidentata (Pamashto, Quinilla)	Balata.
Myroxylon balsamum (Estoraque)	Oleoresin-tolu balsam.
Parahancornia Amapa (Naranjo-podrido)	Latex mixed with balata.
Protium spp. (Copal caspi)	Resin for calking canoes and launches.
Pseudolmedia spp. (Itaúba amarilla, Loro micuna)	Latex for adulterating balata.
Rheedia macrophylla (Charichuela)	Resin for calking canoes.
Sapium spp. (Caucho mashan)	Latex mixed with balata.

TREES CULTIVATED FOR THEIR FRUITS

Name	Special uses	Remarks
Anacardium occidentale (Marañón)	Cashew nut of commerce.	
Anona spp. (Chirimoya, Guanabana)		
Artocarpus communis (Arbol del pan)		Native of East Indies and Pacific Islands.
Bixa Orellana (Achiote; A.-blanco; A.-colorado)	Vegetable dye from pulp in fruit for coloring foodstuffs.	
Carica Papaya (Papaya)		Native of East Indies.
Citrus spp. (Limón, Naranja)		Native of Old World tropics.
Coffea arabica (Café)		Native of tropical Africa.
Crescentia Cujete (Huingo)	Drinking vessels and dishes from the calabash	Native of West Indies.
Inga spp. (Shimbillo)		
Jatropha Curcas (Piñón)	Oil from seeds used as an illuminant	Native of Central America.

Name	Remarks
Mangifera indica (Mango)	Native of East Indies.
Persea americana (Palta, Huira palta)	Apparently the West Indian avocado introduced by way of the Amazon.
Psidium Guajava (Guava, Guayaba)	
Spondias spp. (Ciruela, Ubo)	
Terminalia Catappa (Almendro, Castaña)	Native of East Indies.
Theobroma Cacao (Cacao)	

DESCRIPTIONS OF THE WOODS

The sequence of the families is according to the classification of Engler and Prantl, and the genera and species within the families are arranged alphabetically. The general plan followed is to describe each family on the basis of material collected, giving the principal characters of the leaves, flowers, and fruits. This is followed by a summary of the salient structural features of the dried woods, including descriptions of the physical properties, the macroscopic characters discernible without any other mechanical aids than a sharp knife and a simple lens magnifying fourteen diameters, and the main microscopic features—type of vessel perforations and vessel pitting, type of rays, fiber pitting, and extraordinary structure—which can be used as bases for identification. This is repeated for the genera. In the case of the species, consideration is given to the dimensions of the tree or shrub, its habitat, local uses, physical properties, and structure of its wood, and the place where collected, indicated according to department and locality, followed by the collector's number.

The following are the principal regions in the montaña and the respective altitudes where collections were assembled. They are listed together with the corresponding field numbers (inclusive) for those regions:

Department of Loreto	Field numbers
Middle Peruvian Amazon; alt. 350–550 ft.	
Lower Itaya; alt. 400 ft.	1–252
Upper Itaya; alt. 450–500 ft.	
Paraíso	3203–3388
San Antonio	3389–3524

Department of Loreto (*Continued*)

Middle Peruvian Amazon	Field numbers
Lower Nanay; alt. 400–450 ft.	253–726
Middle Nanay; alt. 450–500 ft.	727–887, 3187–3202
Upper Nanay; alt. 450–550 ft.	888–1301
Vicinity of Iquitos; alt. 400 ft.	1302–1566, 3525–3795, 7893–8252
Lower Peruvian Amazon; alt. 350–400 ft.	
Pebas	1567–2006
Caballo-cocha	2007–2508
La Victoria, near Peruvian-Brazilian boundary	2509–3186
Lower Huallaga; alt. 450–550 ft.	
Yurimaguas	3796–4180, 7815–7891
Fortaleza	4181–4543
San Ramón and along Paranapura	4544–4752
Santa Rosa	4753–4964
Puerto Arturo	4965–5374
Department of San Martín	
Plain of Tarapoto; alt. 1,400 ft.	5375–5644, 6285–6325, 6493–6750
Morales, near Tarapoto	5645–5726
Cumbasa, near Tarapoto	5727–5788
Slopes of Guayapurima, above Tarapoto; alt. 1,400–2,600 ft.	5789–6189
Juan Guerra, near junction of Mayo and Huallaga rivers; alt. 1,800 ft.	6190–6284, 6836–6923
Rumisapa, between Tarapoto and Lamas	6751–6835
Lamas; alt. 1,800–2,400 ft.	6326–6492
San Roque–Campana–Moyobamba; alt. 2,700–3,500 ft	6924–7533, 7615–7814
Department of Amazonas	
Chachapoyas–Río Utcubamba; alt. 7,000–8,000 ft.	7534–7614

In the following pages are described 660 species, representing 307 genera of 75 families of Dicotyledons.

PIPERACEAE. Pepper Family

1. PIPER L.

Shrubs or small trees, sometimes wholly herbaceous, rarely scandent. Leaves alternate, entire, the stipules adnate to the base of the petiole. Flowers minute, green, densely crowded in slender spikes, which resemble catkins. A vast group, probably with a greater number of species than any other genus of tropical American plants. The leaves are more or less aromatic and the fruit of some species is edible. The common name applied in northern Peru, as in other tropical American countries, to all or most species of *Piper* is "cordoncillo."

Wood yellowish or of various shades of brown and heartwood sometimes well defined and darker brown; sometimes slightly fragrant or has a fetid odor; fine- or medium-textured; light to fairly heavy; easy to cut and at times takes a moderately or highly lustrous finish; not durable. Parenchyma paratracheal, fairly distinct or distinct. Pores of medium size or small; numerous or fairly numerous; usually arranged in radial rows of 1 or 2 pores between each pair of rays; solitary or, less frequently, in multiples; open or closed. Rays fairly broad or very broad on cross section; usually distinct on tangential; conspicuous and often very high on radial surface; distinctly heterogeneous; multiseriate and numerous cells high.

Piper arrectispicum Trel. Field Mus. Bot. 13, pt. 2: 137. 1936.

Shrub, 12 feet tall. Trunk straight, slender, and unbranched for 3 feet. Bark up to 0.25 inch thick, pale brown, with numerous, rather coarse fissures.—Uncommon; in open dry medium loam (alt. 3,500 ft.).

Wood creamy yellow with slaty gray streaks caused probably by stain; straight- or moderately straight-grained; fairly coarse-textured; of medium weight. Pores of medium size; fairly numerous and well distributed; solitary or, less frequently, in radial, oblique, or tangential multiples of 2. Vessel lines indistinct or barely visible without lens. Rays yellowish and broad on cross section; visible or indistinct on other surfaces.

San Martín: San Roque, *6993*.

Piper fortalezanum Trel. Field Mus. Bot. 13, pt. 2: 166. 1936.

Small, straggly tree or tall shrub, 15 feet in height. Trunk slender and branching 1 or 2 feet from the base. Bark pale yellowish

brown with long, vertical, fairly coarse fissures and small lenticels. Fruit yellowish white; July–August.—In thickets (alt. 350–500 ft.).

Wood pale brown and fairly lustrous; slightly fragrant; straight-grained; coarse-textured; light in weight, but firm. Pores of small or medium size; solitary, less frequently in small radial multiples and in small clusters. Rays broad or fairly broad, lighter-colored than ground mass, and conspicuous on cross section; not distinct, but visible on other surfaces. Pith medium brown with lustrous deposit of calcium oxalate.

Loreto: Caballo-cocha, *2120;* Fortaleza, lower Huallaga, *4351.*

Piper granuligerum Trel. Field Mus. Bot. 13, pt. 2: 169. 1936.

Shrub, 16 feet tall. Crown flat and with few branches. Trunk long and somewhat contorted. Bark medium brown or pale gray with long and fairly deep fissures.—In dry loam in old clearings (alt. 450 ft.).

Sapwood yellowish or pale pinkish brown; heartwood dark chocolate brown and susceptible to insects. Wood light in weight, but firm. Pores fairly numerous and well distributed; mostly solitary.

Loreto: San Antonio, upper Itaya, *3459.*

Piper nanayanum Trel. Field Mus. Bot. 13, pt. 2: 196. 1936.

Small tree, 25 feet in height. Crown open. Bark medium chocolate brown. Fruit yellowish white; April–May.—Of limited distribution; in the vicinity of streams (alt. 450 ft.).

Sapwood pale yellowish brown; heartwood dark chocolate brown. Wood has a slightly fetid odor when fresh; straight- or wavy-grained; coarse-textured; light in weight, but firm. Pores of medium size; fairly numerous, well distributed; solitary, in radial multiples of 2–3 or more, or in small clusters. Rays distinct or conspicuous on cross and radial surfaces. Pith deep pinkish brown; large gum ducts(?) present.

Loreto: lower Nanay, *516.*

Piper pebasense Trel. Field Mus. Bot. 13, pt. 2: 206. 1936.

Small tree or tall shrub, 15 feet in height. Crown open. Trunk slender and branching 2 or 3 feet from the base. Bark pale brown with small scales and rather coarse lenticels.—In sandy loam, among shrubs and low trees of second growth or along margin of forest (alt. 380 ft.).

Wood yellowish or pale brown with broad, long, darker brown markings of rays; wavy-grained; coarse-textured. Pores fairly

small; rather numerous, well scattered; solitary or in radial multiples of 2–4, seldom in tangential alinement; open or closed. Rays broad; very conspicuous on tangential and radial surfaces. Pith medium brown or grayish white.

Loreto: Pebas, *1746*.

Piper Sellertianum Trel. Field Mus. Bot. 13, pt. 2: 231. 1936.

Shrub, 11 feet in height. Bark chocolate brown, with numerous, fine fissures.—Not common; forming undergrowth in dense, flood-free forest (alt. 400 ft.).

Sapwood pale brown; heartwood grayish brown. Wood fairly straight-grained; coarse-textured. Parenchyma paratracheal; barely visible with lens. Pores arranged mostly in one radial row between each pair of rays. Rays broad, whitish, and prominent on cross section; visible in proper light on radial surface.

Loreto: lower Itaya, *484*.

Piper sericeonervosum Trel. Field Mus. Bot. 13, pt. 2: 233. 1936.

Small tree, about 25 feet in height. Crown open. Trunk bent, round, slender, and unbranched for half the height. Bark purplish or rufous brown and moderately smooth.—In open, dry loam in scant growth or along margin of forest (alt. 380 ft.).

Sapwood pale purplish brown; heartwood not sharply defined, light brown. Wood straight-grained; light in weight, but firm. Pores fairly small; solitary or in small radial or oblique multiples. Rays distinct or conspicuous on all surfaces. Numerous small specks of dark brown gum distinct under lens on all surfaces.

Loreto: La Victoria, *2928*.

Piper Stuebelii Trel. Field Mus. Bot. 13, pt. 2: 238. 1936.

Tall shrub or small tree, 21 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched for 14 feet. Bark pale grayish or medium brown, with numerous, short, rather coarse ridges and small, darker brown lenticels. Flowers yellow; December–January.—Uncommon; in slightly humid loam in fairly dense growth (alt. 1,500 ft.). The sap obtained from the crushed leaves is used as a remedy for eye ailments.

Wood creamy yellow or grayish; has a faintly spicy odor; moderately light in weight; slightly fibrous. Pores of medium size and mostly solitary. Rays broad, uniformly spaced, yellowish brown, and conspicuous on cross section; lighter-colored than the surround-

ing elements and at limit of vision in proper light on radial. Pith pale yellowish brown, septate.

San Martín: Tarapoto, *5622*.

Piper yurimaguasanum Trel. Field Mus. Bot. 13, pt. 2:253. 1936.

Tree, 35 feet tall. Crown spreading. Trunk bifurcating from base. Bark medium brown, with small, indistinct lenticels. Flowers yellow; October–November.—In dry loam in pasture and old clearings (alt. 450 ft.).

Sapwood yellowish or pale brown; heartwood chocolate brown. Wood moderately straight- or wavy-grained; coarse-textured; light in weight, firm; easy to cut, but does not take a smooth polish; checks in drying; not durable. Pores of medium size; in single rows between each pair of rays; solitary, in radial multiples of 2–3, also in small oblique or tangential multiples and in small clusters. Rays apparently of two sizes, the larger ones conspicuous on cross section; visible without lens on tangential; grayish brown, high and distinct in proper light on radial; numerous small globules of dark brown gum present in cells on tangential and radial sections and sometimes on transverse.

Loreto: Puerto Arturo, lower Huallaga, *5184*.

LACISTEMACEAE. Lacistema Family

1. LACISTEMA Swartz

Shrubs or small trees. Leaves entire, glabrous or nearly so. Flowers in spikes in the leaf axils. Fruit baccate or capsular. Timber is not used locally.

Wood yellowish or pinkish to reddish brown and moderately lustrous; medium- or fairly coarse-textured; of light or medium density; inclined to be fibrous, splintery, or brittle; checks in drying; fairly durable. Parenchyma indistinct or in very fine tangential lines extending between the rays. Pores of fairly small or medium size; moderately numerous or numerous; solitary, less frequently in multiples or small clusters; seldom closed. Rays fairly fine or fine, numerous, and closely spaced on cross section; occasionally distinct on radial.

Vessels with scalariform perforations, with up to 20 bars; intervascular pits small and in horizontal alinement; vessel-ray pits small, simple to half-bordered. Rays heterogeneous and with coarse upright cells; uni- or biseriate, occasionally triseriate.

Lacistema aggregatum (Berg) Rusby, Bull. N. Y. Bot. Gard. 4: 447. 1907. *Palo metahuayo, Huacapurana, Trompohuayo.*

Small, slender, glabrous tree, seldom exceeding 25 or 30 feet high. Crown conical or open. Trunk straight, cylindrical, and clear of branches up to four-fifths the entire height. Bark reddish or dark grayish brown, fairly smooth; inner bark deep pinkish brown. Leaves alternate, short-stalked, oblong or elliptic-oblong, acuminate, entire or nearly so. Flowers minute, in very short, dense, clustered spikes; June–October. Fruit a small 3-valved capsule, red when mature.—Common throughout northeastern Peru (alt. 400–4,800 ft.); most abundant in the lowland in thickets and old clearings along the Amazon, Putumayo, and Huallaga rivers, while in the highland the species has been reported from Tarapoto, San Roque, San Ramón, along the Pichis Trail, and at La Merced.

Sapwood lustrous pale brown, in some specimens with a pale grayish cast; heartwood indistinctly defined, light brown. Wood has no characteristic odor or taste; straight-grained; fine- or fairly fine-textured; of light or medium weight, tenacious, and suggests willow (*Salix*); easy to work and saws slightly woolly; checks in drying; not durable. Growth rings poorly defined or indistinct. Parenchyma indistinct under lens. Pores visible only with lens; numerous and inclined to be crowded; in radial multiples of 2–6 or more, less frequently solitary; mostly open. Vessel lines fine, of same color as background, and barely visible without lens.

Loreto: Caballo-cocha, *2154, 2413;* near Iquitos, *3703;* lower Huallaga, *4680.*

Lacistema Nena Macbr. Candollea 5: 392. 1934. *Nena.*

Tree, about 20 feet in height. Crown conical. Trunk slender, straight, columnar, and clear of limbs for about half the entire height. Bark reddish brown and fairly smooth; inner bark coarsely fibrous.—Not common; in open patches in forest free from periodical inundations or in thickets (alt. 380 ft.). Timber used only for fuel.

Sapwood pale yellowish or pinkish brown; heartwood indistinctly defined, pinkish brown. Wood straight- or interlocked-grained; fine-textured; light in weight, but firm and strong; easy to cut, saws slightly woolly, and takes a smooth, lustrous polish. Growth rings present owing to variation in color. Pores smaller and not as numerous as in *L. aggregatum;* solitary or in radial multiples of 2–4 or more. Vessel lines short and very fine.

Loreto: Pebas, *1876.*

Lacistema rosidiscum Macbr. Candollea 5: 392. 1934.

Forest tree, 20 to 30 feet in height. Crown spreading or conical. Trunk straight, columnar, slender, and unbranched for one-third to one-half the entire height. Bark pale gray or dark brown, rough, and with low, vertical ridges; inner bark not as fibrous as in the other species.—In dense forest (alt. 1,300–4,500 ft.). The strong, durable timber is esteemed for use in general construction and carpentry.

Wood pinkish or light brown, with no sharp distinction between sapwood and heart; of medium weight; easy to work and takes a smooth polish. Growth rings faintly visible at times. Pores small or minute; fairly numerous and well scattered; mostly in radial multiples of 2–6; open. Rays slightly more distinct on radial surface than in the other species.

San Martín: Tarapoto, *6721;* San Roque, *7216.*

CHLORANTHACEAE. Chloranth Family

1. HEDYOSMUM Sw.

Hedyosmum racemosum (Ruiz & Pavón) G. Don, Gen. Syst. 3: 434. 1834; ex Solms in DC. Prodr. 16, pt. 1: 483. 1869. *Asar-quiro.*

Straggly tree, 25 feet tall. Crown open. Trunk bent, round, 8 inches in diameter, and unbranched for 5 feet. Bark chocolate brown and deeply fissured. Leaves short-petiolate, subcoriaceous, glabrous, ovate or ovate-lanceolate.—Uncommon; in dense forest (alt. 3,500 ft.).

Wood pale brown with a grayish hue and dark brown markings of rays; odorless and tasteless; wavy-grained; coarse-textured; fairly light in weight, but firm and strong; easy to cut, takes a fairly smooth finish, and holds its place well; not durable. Growth rings absent. Parenchyma indistinct. Pores fairly small or of medium size; moderately numerous, uniformly scattered; in radial multiples of 2–4, and less frequently in diagonal or tangential pairs, in small clusters or solitary; open. Vessel lines short, of same color as background, and faintly visible without lens. Rays broad, of a light brown color, and readily visible on cross and tangential sections; high and conspicuous on radial surface.

Vessel perforations scalariform. Rays heterogeneous; decidedly multiseriate and very high.

San Martín: San Roque, *7006.*

SALICACEAE. Willow Family

1. SALIX L.

Salix chilensis Molina, Sagg. Chil. 137. 1782. *Pajarobobo* (lowland), *Sauce* (upland).

Small, deciduous tree, up to 30 feet in height. Crown conical or spreading; branches long, drooping. Trunk often bent, 12 inches or more in diameter, and unbranched for 21 feet. Bark reddish or dark brown with a grayish tinge, fairly smooth or with long, coarse fissures; inner bark fibrous and is used for cordage. Leaves lanceolate; foliage much lighter and brighter green than is usual in tropical trees. Capsule ovoid or elliptic, dark brown when mature, fruiting before or when the leaves are borne.—Widely distributed; at Florida on the Putumayo River, in the lower Nanay, lower Huallaga, and in the Andean uplands (alt. 380–6,000 ft.). The species is widely dispersed in tropical America and is the only representative of the genus south of Guatemala. The flexible twigs are employed in the Andean regions for basketry.

Sapwood whitish or light pinkish brown with a pale grayish tinge and lustrous; heartwood reddish brown. Wood has no distinctive odor or taste; straight-grained; moderately fine- or medium-textured; fairly light in weight, but firm and strong; saws woolly, easy to work, and takes a smooth finish; not durable; resembles willow (*Salix*). Parenchyma indistinct. Pores at limit of vision; numerous, diffuse; solitary or in radial multiples of 2–3, infrequently in small oblique or tangential multiples; mostly open. Vessel lines fine, but faintly discernible without lens. Rays fairly fine, numerous, and evenly spaced on cross section; indistinct on tangential; of lighter color than the surrounding elements and visible on radial.

Vessel perforations simple; intervascular pits rather large, half-bordered; vessel-parenchyma pits simple and of about the same size as intervascular. Rays heterogeneous; uniseriate or partly biseriate.

Loreto: lower Nanay, *460;* near Yurimaguas, lower Huallaga, *4447*.

JUGLANDACEAE. Walnut Family

1. JUGLANS L.

Juglans neotropica Diels, Bot. Jahrb. 37: 398. 1906. *Nogal.*

Tree, up to 50 feet tall, although said to attain a height of 95 feet. Crown spreading or irregularly round. Trunk straight, colum-

FIG. 15. "Nogal" or Peruvian walnut, *Juglans neotropica* Diels, at Chachapoyas.

nar, up to 24 inches in diameter, and divided 10 or 15 feet above the ground, infrequently free of branches for half the height. Fruit reddish brown, round, with a grayish brown, velvety layer, turning black at maturity; seeds black when ripe and the sweet, brown kernel is edible; January–February.—In sandy or dry medium loam (alt. varying between 5,000 and 7,200 ft.), mostly in ravines and valleys below the general level of the country, and often cultivated in the vicinity of Chachapoyas in association with *Eucalyptus;* common also along the banks of the Utcubamba, an affluent of the Marañón, and scattered irregularly from Daguas, east of Chachapoyas, through to the Pacific coast. Peruvian walnut is reported to grow also along the western Andean slopes bordering the upper reaches of the Ucayali, in the Chanchamayo Valley, and along the Pichis Trail. (For further notes on its distribution see page 47.) Its timber is highly prized locally for furniture, cabinet-making, and musical instruments, but due to the remoteness of the territory and physiographic obstacles exploitation of this useful wood is hampered. A decoction of the leaves, fruit, and bark is used for dyeing.

Sapwood well demarcated, light brown with a grayish or pale pinkish cast and occasional darker striping; heartwood dark purplish brown. Wood when fresh has a faint odor suggesting vinegar; straight- or roey-grained; medium- or coarse-textured; rather heavy, firm, compact, and strong; easy to work, takes a smooth and fairly lustrous finish, and holds its place well; durable. Growth rings visible owing to variation in depth of color and abundance of elements. Parenchyma in fine, evenly spaced, broken or continuous, tangential lines extending between the rays, and sometimes in broad, concentric, unevenly spaced bands, which appear to indicate growth rings. Pores of medium size or large; few, ring-porous; solitary or less frequently in radial multiples of 2–3; mostly open. Vessel lines short or fairly long and discernible to unaided eye; lustrous tyloses frequently present and deposits of calcium also visible on all surfaces. Rays fine and distinguishable only with lens on cross section; indistinct on tangential; low and barely discernible with lens or fairly distinct on radial surface.

Vessels with simple perforation plates; vessel-ray pits numerous, but not crowded, simple to half-bordered. Rays heterogeneous; 1–3 cells wide and few to about 30 cells high. Crystals sometimes present in parenchyma strands.

Amazonas: Chachapoyas, *7563.*

ULMACEAE. Elm Family

1. TREMA Lour.

Trema micrantha (L.) Blume, Mus. Bot. Lugd. Bat. 2: 58. 1853. *Atadejo, Atadijo, Yana-caspi.*

Slender shrub or small tree, seldom exceeding 30 feet in height. Crown spreading or conical. Trunk usually straight, round, up to 10 inches in diameter, and free of branches for about 15 feet. Bark variable in color from light to dark chocolate brown, fairly smooth; on account of its toughness and strength it is used for cordage and for binding tobacco. Leaves alternate, in two rows, ovate or lanceolate, finely serrate, rough, especially on the upper surface. Drupe round.—Very common throughout the lowland and upland (alt. 400–3,500 ft.); in dry or slightly humid loam in old clearings and thickets; reported also from San Ramón, in the Chanchamayo Valley, near the Perene Colony, Department of Junín (alt. 4,600 ft.), and Pampayaco, Department of Huánuco.

Wood oatmeal-colored or pale brown; odorless and tasteless; straight- or fairly straight-grained; medium-textured; light in weight, but firm and strong; requires a sharp knife to cut smoothly across grain and takes a smooth polish with a fairly high luster; not durable in contact with the ground. Its structure is different in many respects from *Celtis* and *Ulmus*, which belong to the same family. Parenchyma paratracheal; scantily developed, and indistinct with lens. Pores of medium size or fairly large; moderately numerous or numerous, diffuse; solitary or less frequently in radial multiples of 2–4, seldom in small clusters; open. Vessel lines fine and darker than background. Rays fine or fairly fine, numerous, curving at point of contact with the pores on cross section; fairly distinct or distinct on radial.

Vessels do not have spirals and have simple perforations; pits into the vessels irregular, often much elongated horizontally, simple to half-bordered. Rays heterogeneous. Wood fibers thin-walled and have simple pits.

Loreto: lower Itaya, *80, 194;* lower Nanay, *366, 368;* Pebas, *1759;* La Victoria, *2591;* lower Huallaga, *4225, 5152.*—San Martín: Tarapoto, *5765;* San Roque, *7376.*

MORACEAE. Mulberry Family

One of the larger families of Peruvian plants, consisting chiefly of trees or shrubs, some of them epiphytic, and characterized by the presence of latex contained mostly in the secondary cortex or phloem

and which in some instances, especially *Castilla* and some *Ficus* species, is the source of commercial rubber. Leaves usually alternate and provided with large, mostly deciduous stipules. Flowers minute or very small, green, of two sexes; they have no petals, and are arranged in heads, spikes, or racemes, frequently conspicuous. Fruit variable as to form, but always more or less juicy.

The woods are of two main kinds: (1) light and soft, approaching balsa wood (*Ochroma*); (2) of medium weight to rather heavy and hard. Sapwood oatmeal-colored, whitish, or creamy yellow to light brown, sometimes pinkish, and often with a light or dark gray stain; heartwood often sharply defined, deep yellow to dark chocolate brown. Wood medium- to coarse-textured; sometimes fibrous, in others capable of taking a smooth and highly lustrous polish; perishable or durable. Parenchyma paratracheal and in fine or distinct, tangential or concentric bands, often uniting the pores, suggesting that of some of the Leguminosae. Pores of medium size to large; few or numerous and usually diffuse, seldom with a tendency to ring-porous; predominantly solitary, also in multiples; often filled with tyloses, calcium, or dark gum. Rays moderately fine or rather distinct on cross section; sometimes visible on tangential; most frequently distinct on radial surface.

Vessel perforations exclusively simple. Tyloses mostly thin-walled. Intervascular pits numerous, small or large, often screw-head type; vessel-ray pits simple to half-bordered. Rays usually heterogeneous; from 1–6 cells wide and few to many cells high; often gummy. Wood fibers thin- or thick-walled; often septate in *Ficus* and *Castilla;* pits small or very small, numerous, and simple; the cavities sometimes filled with gum.

1. ANONOCARPUS Ducke

Anonocarpus amazonicus Ducke, Archiv. Jard. Bot. Rio Jan. 3: 39. 1922. *Mashunasti.*

Tall tree, often up to 90 feet in height. Crown spreading. Trunk moderately straight, cylindrical, with small buttresses, and free of limbs up to 65 feet. Bark fairly thick, reddish brown, and exudes when cut a plentiful supply of slightly sweet latex. Leaves entire, ovate, leathery or subleathery, acuminate, rounded at base, and glabrous or nearly so. Fruit globose, light green, and succulent; November–December.—Of limited distribution; in dense, flood-free forest (alt. 500 ft.). The fairly dense wood is employed for canoes.

Sapwood oatmeal-colored, sometimes with dark streaks, and turning to a pinkish or russet color on exposure to air; heartwood thin, pale or dark brown. Wood odorless and tasteless; straight- or irregular-grained; medium- or rather coarse-textured; of medium weight and fairly hard; easy to work, takes a moderately smooth polish, and holds its place well; fairly durable, although liable to stain in drying. Growth rings indistinct or poorly defined. Parenchyma abundantly developed; paratracheal and in fine or conspicuous, broken or continuous, fairly evenly spaced, concentric bands. Pores of medium size or fairly large; not numerous, diffuse; solitary or less often in small radial multiples, seldom in small clusters; open or closed. Vessel lines distinct and darker than background. Rays fairly broad on cross section; distinct on tangential; inconspicuous or fairly prominent on radial.

Loreto: lower Huallaga, *5334*.

2. ARTOCARPUS Forst.

Handsome, medium-sized or rather large, evergreen trees native of the East Indies and the Pacific Islands. Crown round or spreading, very dense. Leaves deeply lobed. The trees are planted in the lowland for their large, rough, edible fruits and for shade.

Wood white or silvery gray to yellowish or pinkish brown and with a high luster; odorless and tasteless; straight-grained; medium- or coarse-textured; light in weight and fairly soft to firm; requires a sharp knife to cut smoothly across grain, but takes a smooth finish; not durable. Growth rings not distinct. Parenchyma in narrow bands surrounding the pores. Pores fairly large and readily visible without lens; fairly numerous and evenly scattered; solitary, less frequently in radial, seldom tangential, multiples of 2 or more; open. Vessel lines appear as dark brown scratches. Rays distinguishable without lens on cross and tangential sections; producing a characteristic figure on radial surface; heterogeneous.

Artocarpus communis Forst. Char. Gen. 100. 1776. *Arbol del pan.*

Tree, up to 70 feet in height. Trunk sometimes appressed, bifurcating near the base or free of limbs up to 18 feet, from 8 to 14 inches in diameter, and with small buttresses. Bark light to dark chocolate brown, fairly smooth, with fibrous inner bark, and yields a viscid, insipid latex. Leaves about 18 inches long and 16 inches wide, pubescent on both surfaces.

Loreto: Caballo-cocha, *2151;* Yurimaguas, lower Huallaga, *3989*.

3. **BROSIMUM** Swartz

Large trees. Leaves short-stalked, ovate or oblong, more or less leathery, glabrous, entire except sometimes on young shoots. Receptacles globose, many-flowered. Fruit rather large, globose, with abundant flesh.

The trees measure up to 130 or 150 feet in height. Crown spreading, round, or almost flat. Trunk erect, cylindrical, 17–30 inches in diameter, and unbranched up to 85 feet. Bark pale gray, rufous, or dark chocolate-colored, scaly or fissured, and secretes a fairly copious quantity of slightly sweet latex when cut. Fruit ovoid; April–June.—Fairly common in limited localities, usually in sandy or dry medium loam in dense tall forest (alt. 400–500 ft.). The dense heartwood is employed locally for handles for axes, bush-knives, and other purposes requiring durability.

The "palo de sangre" of the Peruvian Amazon is distinguished by having a large core of beautiful red heartwood which suggests the "muirapiranga" (*Brosimum paraense* Huber); sapwood well defined, oatmeal-colored, white, yellowish, or pale brown. Wood odorless and tasteless; takes a smooth and fairly or highly lustrous polish; durable. Parenchyma paratracheal and in fine, tangential lines or bands, often confluent. Pores of medium size and mostly solitary. Rays usually visible only with lens on cross and tangential sections; slightly darker than background, discernible in proper light or fairly distinct on radial surface. Latex tubes are sometimes present in rays.

Loreto: lower Nanay, *681*, *683*, *725*.

4. **CASTILLA** Cervantes

The generic name is often written *Castilloa*, without justification.

Castilla Ulei Warb. Bot. Jahrb. 35: 674. 1905. *Caucho negro.*

Tree, about 75 feet in height, although said to attain greater stature. Crown spreading. Trunk straight, cylindrical, 12 to 20 inches in diameter, and clear of branches for 55 feet. Twigs and petioles with fairly dense light brown pubescence. Bark moderately thick, pale brown. Leaves deciduous, entire, oblongate, sharply acuminate, cordate at the base.—Fairly abundant; in dense forest (alt. 380 ft.). Castilla trees are the source of caucho or rubber, which is tapped by making oblique incisions on the trunks. The amount of caucho gathered in the Amazon basin during 1910–11 was estimated to be approximately 20 per cent of the total rubber produced during that period. Attempts at cultivation of the trees on a large scale have not proved profitable. Timber is not utilized locally.

Wood brown or oatmeal-colored, lustrous, and with no clear demarcation between sapwood and heartwood. Wood has no distinctive taste, but is slightly fragrant when fresh; straight-grained; medium- or coarse-textured; light and soft, but firm; saws woolly; not durable. Growth rings absent or poorly defined. Parenchyma paratracheal and sometimes aliform. Pores of medium size to large; not numerous, well scattered; solitary, in radial multiples of 2–4, seldom in small clusters; open or closed. Vessel lines distinct. Rays fairly broad on cross section; distinct on radial, appearing darker than background.

Vessels with simple perforations. Tyloses thin-walled. Rays somewhat heterogeneous; 1–4 cells wide and up to 50 cells high; pits into vessels fairly large, often elongated, simple to half-bordered. Fibers thin-walled; often septate.

Loreto: Pebas, *1802*.

5. CECROPIA L.

Small or medium-sized trees with hollow, whitish, smooth, and slender trunks. Leaves very large, peltate, deeply lobed, usually whitish beneath and tomentose, and clustered at the ends of the few stout branches; stipules large and deciduous. Flowers dioecious, in dense spikes, these clustered at the end of short or long peduncles. The trees are short-lived, rapid-growing, of distinctive appearance, often forming almost pure stands along river banks, on sand bars, and in flood plains; they also quickly invade clearings in the forest and stand out conspicuously among all other trees. Their stems are hollow, with thin, widely separated partitions, and are habitually infested with small ants that inflict severe bites when the tree is molested. The light, perishable wood has no local uses except for kindling, but has potential value for paper pulp. The fibrous bark is useful for cordage. The local name "setico" is given to all or most of the trees.

Wood whitish or oatmeal-colored to pale, seldom dark, brown; odorless and tasteless; coarse-textured; light and soft; fibrous and often requires a sharp knife to cut smoothly across grain; fairly or highly lustrous; perishable. Parenchyma abundantly developed about pores and connecting some of them into short or long, mostly irregular, tangential or diagonal chains; usually distinct. Pores rather large and distinct; few to fairly numerous and not crowded; solitary or in multiples; open. Rays moderately fine or rather broad

on cross section; sometimes faintly visible on tangential; conspicuous on radial surface, appearing darker than background.

Vessels with simple perforations; intervascular pits large, bordered; vessel-ray pits also large, half-bordered. Rays heterogeneous, or at times showing a tendency to homogeneous; up to 5 cells wide and few to 40 cells high. Fibers thin-walled, arranged in radial rows; often septate; pits small, numerous, simple. Pith about the size of a lead pencil or very large.

Cecropia latifolia Miq. in Mart. Fl. Bras. 4, pt. 1: 147. 1853.

Tree, 50 to 70 feet in height. Crown flat. Trunk long, slender, and free of limbs up to three-fourths the height. Bark thick, dark brown, and moderately smooth; inner bark finely fibrous.—Common throughout the Peruvian Amazon; most frequently in the vicinity of streams.

Wood pale pinkish or grayish brown, with occasional dark streaks; saws woolly. Rays not so prominent on radial surface as in *C. Tessmannii*. Pith small.

Loreto: lower Itaya, *96*.

Cecropia leucocoma Miq. in Mart. Fl. Bras. 4, pt. 1: 142. 1853.

Tree, up to 75 feet tall. Crown flat or open. Trunk straight, cylindrical, slender, and free of branches up to three-fifths the height.—Common; along banks of streams and in secondary growth.

Wood almost white or pale pinkish brown and highly lustrous. Rays readily visible, but not prominent. Pith dark chocolate brown.

Loreto: lower Huallaga, *4173*.

Cecropia obtusa Trécul, Ann. Sci. Nat. III. 8: 79. 1847.

Small or medium-sized tree, from 35 to 55 feet tall. Crown flat or round. Trunk straight, slender, cylindrical, and free of limbs for three-fourths the height. Bark greenish gray; inner bark coarsely fibrous. Flowers chocolate brown.—Common; along banks of streams and in secondary growth (alt. 400–3,500 ft.). Timber used mostly for kindling.

Wood pale yellow or light brown and has a golden luster when held to proper light; saws woolly. Rays of same color as background, but readily visible on radial surface. Pith narrow or broad and with thick septa.

Loreto: Caballo-cocha, *2068;* La Victoria, *2557*.—San Martín: San Roque, *7372*(?).

Cecropia sciadophylla Mart. Flora 24, pt. 2: Beibl. 93. 1841.

Tree, up to 85 feet in height. Crown flat. Trunk straight, cylindrical, 17 inches or more in diameter, unbranched for more than half the entire height, and with large surface roots or small buttresses.—Common; in dry or slightly humid loam, most frequently adjacent to watercourses (alt. 380 ft.).

Wood pale yellow with occasional purplish or dark streaks; firmer than the other *Cecropia* species. Rays not readily distinguishable to unaided eye. Pith reddish or chocolate brown; septa thick.

Loreto: Caballo-cocha, *2130*.

Cecropia Tessmannii Mildbr. Notizbl. Bot. Gart. Berlin 9: 260. 1925. *Pungara, Setico de oyada.*

Tree, from 35 to 65 feet in height. Crown open or round. Trunk straight, cylindrical, 11 inches in diameter, and free of limbs for upwards of half the height. Bark grayish or pale brown, thin, and smooth; inner bark coarsely fibrous and is used for cordage and mats. Sapwood secretes a small quantity of viscid resin when cut. Leaves dark reddish brown above and pale brown on the under surface. Flowers yellow, with long, stout peduncle; October–November.—Common; in swamps or in the vicinity of streams (alt. 450 ft.). In some regions of the lower Amazon the timber is used to some extent as a source of paper pulp and for rafts, also for troughs.

Wood not clearly defined into sap and heart, oatmeal-colored, and with a high silvery luster; odorless and tasteless; straight-grained; coarse-textured; easy to work and takes a smooth finish. Growth rings indistinct or present, owing to slight variation in color. Parenchyma paratracheal. Pores large; fairly numerous and uniformly scattered; solitary and circular or oval in outline, also in radial multiples of 2–3, seldom more; open. Vessel lines coarse and of darker color than background. Rays faintly visible to unaided eye on cross section; indistinct on tangential; readily discernible on radial surface where they are of darker color than background.

Loreto: lower Huallaga, *4313, 4949*.

6. CHLOROPHORA Gaud.

Chlorophora tinctoria (L.) Gaud. in Freyc. Voy. Bot. 508. 1826. *Insira, Limulana.*

Deciduous forest tree, up to 60 feet in height, with an extensive range in tropical America (see Timbers of Tropical America, 118–122).

Crown spreading. Trunk straight, cylindrical, up to 19 inches in diameter, and clear of limbs for 20 feet or so. Bark pale or dark brownish gray, with shallow fissures and lighter brown lenticels, and secretes when cut a tasteless, yellowish resin. Branches often armed with long, stout spines. Leaves glabrous, entire or serrate; those of young branches frequently lobed and suggesting mulberry (*Morus*). Flowers of two sexes on separate trees, the staminate in long catkins, the pistillate in dense heads. Fruit rounded, with numerous brown seeds.—Common; in well-drained soil and in the vicinity of streams (alt. 400–1,600 ft.). The tree is of economic importance as the source of fustic, one of the most important dyewoods of commerce, and is employed for brown, yellow, and green dyes, especially for the olive-drab of khaki. Its use dates back to the middle of the seventeenth century. The heartwood is esteemed locally for house construction, furniture, and general carpentry.

Sapwood whitish or pale yellowish white, often with darker streaks or grayish cast; heartwood sharply defined, bright yellow or pinkish brown. Wood odorless and tasteless; straight- or interwoven-grained; medium- or fairly coarse-textured; of medium weight, more or less horn-like; easy to work, takes a smooth finish; strong and durable; resembles Osage orange (*Maclura aurantiaca* Nutt.) in color, texture, and density. Growth rings sometimes distinct owing to alinement of elements, parenchyma lines, or to poreless zones. Parenchyma paratracheal and confluent, infrequently terminal; distinct on cross section and visible on tangential in proper light; some specimens have considerably more parenchyma than others. Pores of medium size or fairly large and distinct owing to parenchyma; few to fairly numerous, well distributed or showing a slight tendency to ring-porous; solitary or in radial multiples of 2–5. Vessel lines visible, but not conspicuous, alternately short and long, darker than background; tyloses abundant in vessels. Rays fine or faintly visible on cross section; sometimes discernible on tangential; fairly distinct to distinct on radial.

Vessels with simple perforations. Tyloses thin-walled. Vessel-ray pits medium-sized or rather large, half-bordered to simple. Rays mostly homogeneous; 1–5 cells wide and few to 40 cells high. Fibers in definite radial rows, thick-walled, with small, simple pits. Crystals of calcium oxalate common in chambered parenchyma. Latex tubes occasionally present in rays.

Loreto: lower Nanay, *501*, *672;* Caballo-cocha, *2441;* Yurimaguas, *4598;* Iquitos, *8040*, *8217*.—San Martín: Tarapoto, *5435*, *6254*.

7. CLARISIA Ruiz & Pavón

Clarisia nitida (Allem.) Macbr. Field Mus. Bot. 11: 15. 1931. *Capinuri, Guariúba, Huariúba.*

Glabrous tree of the lowland, up to 140 feet in height. Crown spreading. Trunk straight, cylindrical, 20 to 50 inches in diameter, and clear of limbs for 90 feet. Bark pale brown or almost black, scaly; sapwood and bark yield a copious quantity of bitter yellowish resin, said to be used for healing fractures. Leaves entire, ovate or oblong-ovate, leathery, acuminate, rounded or acute at base and glabrous.—Not common; in dry loam, especially in the vicinity of streams, and forming the upper story of the forest (alt. 380 ft.). Timber is used to a limited extent for canoes and for general carpentry.

Wood yellowish or light brown, at times with a pale vermilion cast; heartwood dark yellowish or chocolate brown; has a slightly unpleasant odor; straight- or interlocked-grained; medium- or fairly coarse-textured; of medium weight, firm, strong, but brittle; saws slightly woolly, but fairly easy to work; durable. Growth rings visible at times owing to alinement of the elements. Parenchyma abundantly developed; paratracheal and in broken, irregularly spaced, tangential lines or bands, invisible or visible to unaided eye. Pores of medium size or fairly large; fairly numerous and well distributed; solitary and, less often, in radial or tangential multiples of 2–4; open or closed. Rays moderately fine or fairly broad on cross section; indistinct on other surfaces.

Vessels with simple perforations. Tyloses thin-walled. Rays homogeneous or inclined to heterogeneous; 1–6 cells wide and few to 50 cells high; pits into vessels half-bordered, often elongated. Wood fibers thin-walled and with very small, simple pits.

Loreto: La Victoria, *2684, 3079.*

8. COUSSAPOA Aubl.

Coussapoa grandiceps Killip, ined. *Renaco-caspi.*

Tree, about 30 feet tall. Crown spreading. Trunk straight, slender, cylindrical, and clear of branches for about 9 feet. Bark light gray or pale brown; inner bark fibrous; bark and fruit secrete a small amount of astringent resin. Leaves ovate, leathery, slightly emarginate or rounded at apex, subcordate at base, and long-stalked. Flowering in October–November.—Fairly common; in dry loam in forest (alt. 500 ft.).

Wood almost white, turning to pink on exposure to air, lustrous; has a slightly fragrant odor when freshly cut, absent or not distinct in dried material; straight-grained; medium- to coarse-textured; light in weight, but firm and tenacious; somewhat fibrous and splintery, but easy to work; not durable. Growth rings present owing to variation in depth of color and abundance of elements. Parenchyma paratracheal, confluent, and in irregularly spaced terminal bands. Pores at limit of vision; not numerous and uniformly scattered; solitary, less frequently in radial multiples of 2–4; open. Vessel lines long and conspicuous owing to dark brown or grayish white deposits. Rays fairly fine or moderately broad on cross section; fairly distinct on tangential and radial surfaces.

Rays heterogeneous; 1–6 cells wide, few to 40 cells high. Vessel-ray pits large, irregular, half-bordered. Wood fibers with numerous, small, simple pits. Pith fairly large, grayish brown, chambered.

Loreto: Yurimaguas, *4179;* Puerto Arturo, lower Huallaga, *5349.*

9. FICUS L.

Shrubs or medium-sized to tall trees. Leaves alternate. Flowers minute, borne on the inside of a small or large, hollow receptacle, this usually globose, with a small opening at the apex, and covered by a few overlapping bracts, the whole receptacle in age becoming fleshy. Fruit (receptacle) similar to that of the cultivated fig (*Ficus Carica* L.). There are three types of *Ficus* plants: (1) lianes, very common in the forests; (2) trees which usually begin growth as epiphytes, germinating on the branches of trees, and as they develop sending down cord-like roots that ultimately enwrap and strangle the host; (3) forest trees of normal growth.

Wood whitish to light brown, sometimes with a pinkish tinge, and often stained dark gray; medium- or coarse-textured; light and soft, some sappy and likely to rot before they can be dried, and liable to be damaged by insects, while a few species are fairly heavy, tenacious, and durable. The structure is laminated, composed of alternate bands of soft and hard tissue. Parenchyma paratracheal and in numerous, irregularly spaced, broken or continuous, concentric bands; often conspicuous. Pores fairly small or large; few to numerous and scattered irregularly; solitary and, less often, in multiples; often filled with calcium or dark gum. Rays moderately fine to rather broad on cross section; sometimes visible on tangential; moderately distinct on radial surface.

Ficus anthelminthica Mart. Syst. Mat. Med. Bras. 88. 1854; Reise Bras. 3: 1128. 1831. *Huitoc.*

Tree, 75 feet tall. Crown open. Trunk moderately straight, slightly compressed, 14 inches in diameter, unbranched for 30 feet, and with large surface roots. Bark light tan-colored, fairly smooth; when incised, bark and wood yield a copious quantity of bitter, creamy latex, used in native medicine as a remedy for anemia. Fruit borne on the main branches; June–July.—Uncommon; in scanty growth in slightly humid loam and near banks of streams (alt. 400 ft.).

Wood creamy yellow or almost white, with dark gum striping and extensive pale or dark gray areas caused probably by stain; odorless and tasteless; straight-grained; coarse-textured; light in weight; saws woolly, takes a moderately smooth finish, and is fairly lustrous in proper light. Growth rings absent. Parenchyma paratracheal, aliform, and sometimes confluent. Pores readily visible; fairly numerous and well scattered; solitary or in radial multiples of 2–4; open. Vessel lines coarse and much darker than background owing to black gum present. Rays lighter-colored than adjacent elements and visible with lens on cross section; faintly distinguishable without lens on other surfaces.

Loreto: Ampi-yaco, near Pebas, *1867.*

Ficus caballina Standl., ined. *Renaquillo.*

Rather straggly tree, 30 feet tall. Crown open. Trunk bent, slightly compressed, slender, unbranched for 6 feet. Bark yellowish or medium brown with coarse ridges and, when cut, exudes a fair quantity of insipid latex which coagulates readily and is used locally to heal wounds and skin infection. Fruit pale red when mature, sweet, and edible.—Fairly common in the lower Peruvian Amazon (alt. 380 ft.); in dry medium loam.

Wood oatmeal-colored with pale gray areas caused by stain; has no distinctive odor, but is sometimes slightly bitter; straight- or slightly wavy-grained; coarse-textured; light in weight, but fairly firm; easy to cut; checks slightly in drying. Parenchyma in rather widely and uniformly spaced concentric bands; at limit of vision and more distinct than in the preceding species. Pores of medium size or fairly large; solitary and in small radial or oblique multiples. Rays fairly prominent; distinguishable only with lens on cross section; sometimes darker than adjacent elements and discernible without lens on radial surface. Pith grayish white, with specks of reddish brown gum.

Loreto: Caballo-cocha, *2075.*

Ficus gemina Ruiz ex Miq. in Mart. Fl. Bras. 4, pt. 1: 98. 1853. *Renaco.*

Tree, 55 feet tall. Crown spreading. Trunk straight, round, 14 inches in diameter, and undivided for 15 feet. Bark pinkish brown, with fairly small lenticels, and exudes a sweet, viscid latex in copious quantity. Fruit rounded, pale yellow when ripe and edible; December–January.—Not common; in sandy loam among medium-sized trees (alt. 1,500 ft.).

Wood creamy yellow or pale pinkish brown, in dried material becoming dark gray because of stain; straight- or slightly wavy-grained; coarse-textured; fairly light in weight, but firm; easy to work and takes a moderately smooth finish. Parenchyma in light-colored, concentric, slightly wavy bands, at limit of vision. Pores readily visible; often filled with black gum. Vessel lines distinct. Rays indistinct without lens.

San Martín: Tarapoto, *5502.*

Ficus glabrata HBK. Nov. Gen. & Sp. 2: 47. 1817. *Oje, Renaco.*

Tree, 55 to 120 feet in height. Crown flat or spreading. Trunk erect, cylindrical, up to 27 inches in diameter, and branching from 1 to 10 feet from the base. Bark pale brown and inner bark finely fibrous or woolly; bark and fruit furnish an abundance of astringent latex, highly esteemed locally as a vermifuge. Fruit rounded, smooth, and lustrous green; July–September.—Widely distributed throughout the montaña (alt. 400–1,400 ft.); in sandy or dry loam in open patches, in old clearings, and along margin of forest.

Wood creamy yellow when fresh, dried material with light or dark gray streaks and patches caused by stain; odorless and tasteless; straight- or slightly wavy-grained; medium- or coarse-textured; of light or medium weight; saws woolly, splinters easily, easy to cut, and takes a moderately high luster; susceptible to insect attacks. Parenchyma in broad, evenly spaced, concentric bands, often uniting the pores; readily visible without lens. Pores at limit of vision, but not large; solitary or in small radial multiples; open or closed. Vessel lines coarse and darker than background owing to dark gum contents. Rays sometimes faintly discernible without lens in proper light on radial section. Pith dark gray.

Loreto: Río Masán, lower Itaya, *100;* San Antonio, upper Itaya, *3458;* San Juan, near Iquitos, *3747.*—San Martín: Tarapoto, *5463.*

Ficus Mathewsii Miq. Ann. Mus. Bot. Lugd. Bat. 3: 298. 1867. *Caucho-renaco, Renaco, Renaquillo.*

Small, straggly or epiphytic tree, at times attaining a height of 60 or 80 feet. Crown flat or spreading. Trunk straight or fairly so, round or compressed, up to 19 inches in diameter, and free of branches for from 6 to 18 feet. Bark light tan or reddish brown, scaly or with rather coarse ridges and small to coarse, dark lenticels. When cut, bark secretes a fairly copious quantity of slightly sweet latex, white when freshly tapped, but soon turning to pale pink on exposure to sunlight. This latex is known locally as "ule" or "hule" and is mixed with balata to improve the consistency of the latter. The name "caucho-renaco" is derived from the fact that the latex coagulates readily when worked between the palms of the hands. Fruit round, reddish pink and mottled yellow; September–December.—Common in the vicinity of Iquitos (alt. 400 ft.); in dry loam along edge of paths or margin of forest.

Sapwood creamy yellow or pale brown, with extensive grayish patches, and in some specimens with dark gum striping; heartwood reddish brown and thin. Wood odorless and tasteless; straight- or moderately straight-grained; medium- or rather coarse-textured; inclined to be fibrous; easy to work. Growth rings sometimes indicated by variation in abundance of parenchyma, which is in concentric bands of lighter color than adjacent elements and at limit of vision. Pores not visible without lens; open or closed. Rays numerous; faintly discernible to unaided eye on tangential; sometimes darker than background and visible on radial. Pith dark chocolate brown.

Loreto: Timbuchi, upper Nanay, *927;* near Iquitos, *3694, 3737, 8012, 8079.*

Ficus paraensis Miq. Ann. Mus. Bot. Lugd. Bat. 3: 298. 1867. *Renaco.*

Tree, 15 to 45 feet tall. Crown moderately flat; branches tortuous. Trunk contorted and up to 12 inches in diameter. Bark purplish or medium brown with a pale greenish tinge, and exudes a small quantity of astringent latex; inner bark finely fibrous. Flowers small, white, and borne on the older branches; May–June. Fruit round, pale brown when mature.—Nowhere common, but widely scattered throughout the lowland (alt. 500 ft.); in slightly humid loam in dense forest.

Wood creamy yellow or almost white to pale pinkish brown, in some specimens with long, irregular, dark brown gum streaks; with-

out distinctive odor and taste; moderately straight-grained; medium-textured; light in weight, but firm; inclined to be fibrous, easy to work, and takes a fairly lustrous finish. Parenchyma in broken or continuous concentric bands; barely visible. Pores of medium size; not numerous; mostly closed. Vessel lines visible, but not prominent. Rays of about same thickness as parenchyma lines on cross section.

Loreto: upper Nanay, *1141;* Yurimaguas, lower Huallaga, *3803.*

Ficus Ruiziana Standl., ined. *Renaco.*

Tree, up to 75 feet in height. Crown spreading. Trunk usually bent, round or fairly so, 9 to 24 inches in diameter above the strong, medium-sized buttresses, and either bifurcating near the base or unbranched up to 18 feet. Bark pale or medium brown with alternately short and long, rather low ridges, and in old trees with coarse lenticels; inner bark finely or coarsely fibrous; furnishes a copious quantity of bitter latex when cut. Fruit round or subround, borne on the main branches; August–September.—Widely distributed in the lowland (alt. 400–500 ft.); in either alluvial or dry loam among shrubs and low trees or in moderately dense forest.

Sapwood creamy yellow or pale brown; heartwood reddish brown. Wood has a slightly bitter taste; is straight- or fairly straight-grained; medium- or coarse-textured; of light or medium weight; easy to cut and holds its place well; liable to stain in drying. Parenchyma readily distinguishable as light-colored, concentric bands; visible also on tangential and radial surfaces. Vessel lines moderately fine or coarse, of dark color owing to gummy contents. Pith dark reddish brown.

Loreto: Caballo-cocha, *2114;* Sapote-yaco, lower Huallaga, *4877;* near Iquitos, *7998.*

Ficus Weberbaueri Standl., ined. *Renaco.*

Straggly, aquatic tree, 45 or 50 feet in height. Crown open. Trunk contorted and up to approximately 30 inches in diameter. Bark medium or chocolate brown and exudes a fair quantity of whitish or pale yellow, slightly astringent latex. Fruit small, rounded; March–April.—Not common; in alluvial loam and in patches subject to periodical floods (alt. 400 ft.).

Wood pale brown throughout and darkening slightly on exposure to air; odorless and tasteless; straight- or fairly straight-grained; medium- to fairly coarse-textured; of light or medium weight; easy to cut and takes a fairly lustrous finish; liable to stain in drying. Parenchyma faintly visible without lens on cross section, readily dis-

cernible on tangential. Pores of medium size; solitary or in radial multiples of up to 4. Vessel lines visible owing to parenchyma sheaths and their color, which is darker than background. Rays faintly distinguishable without lens on tangential and radial surfaces.

Loreto: Río Masán, lower Itaya, *8138*.

Ficus sp. *Capinuri*. Tree, approximately 80 feet tall. Crown spreading. Trunk erect, columnar, and 12 inches or more in diameter. Bark pale green and with fairly coarse lenticels; inner bark almost white when fresh. Fruit round and fairly large; April–May. —Not common; near bank of Amazon River, in fairly dense forest (alt. 400 ft.).

Wood creamy yellow or whitish, dried material with extensive dark gray areas caused by stain; straight-grained; coarse-textured; light in weight, but firm; easy to cut and takes a fairly lustrous finish. Pores at limit of vision; fairly numerous and uniformly scattered; solitary or in radial multiples of 2–3; often filled with dark brown gum. Vessel lines coarse. Rays numerous and fairly fine; indistinct without lens on cross and radial surfaces; darker than adjacent elements and barely visible on moistened tangential.

Loreto: lower Nanay, *500*.

10. OGCODEIA Bur.

Small or medium-sized trees. Wood of variegated color, ranging from yellowish or grayish green to pinkish brown, and heartwood sometimes sharply defined, pale to dark brown; fairly fine-textured; of light or medium density; tending to saw slightly fibrous, brittle, sometimes takes a moderately lustrous finish; fairly durable. Parenchyma paratracheal, aliform, or confluent, rarely terminal. Pores fairly small; numerous or moderately numerous and diffuse; solitary or in multiples; open or, less frequently, closed. Rays moderately fine on cross section; sometimes fairly distinct on radial.

Ogcodeia Tamamuri Macbr. Field Mus. Bot. 11: 64. 1931. *Tamamuri*.

Tree, up to 45 feet in height. Crown spreading; branches break off easily, leaving deep scars. Trunk round, bent, and approximately 12 inches in diameter. Bark pale brown, fairly smooth; wood and bark secrete when cut a fair quantity of bitter, pale yellow resin. Fruit small, round, red and soft when mature; seeds light brown; April–May.—Uncommon; in dense forest free from periodical inundations (alt. 500 ft.). Timber is not used locally.

Sapwood creamy yellow; heartwood sharply defined, brown. Wood odorless and tasteless; straight-grained; moderately fine-textured; light in weight; easy to cut and takes a smooth polish. Growth rings present owing to variation in abundance of elements. Parenchyma surrounding the pores and in very fine, short, irregularly spaced, tangential lines. Pores very small; fairly numerous and well scattered; solitary or in radial multiples. Vessel lines fine and barely visible in proper light. Rays faintly distinguishable without lens on moistened cross section.

Loreto: upper Nanay, *992*.

Ogcodeia Tessmannii Mildbr. Notizbl. Bot. Gart. Berlin 10: 189. 1927. *Naccho-huasca.*

Tree, approximately 35 feet tall. Crown spreading. Trunk straight, round, slender, and free of branches up to 25 feet; often with deep scars of old branches which have fallen off. Bark pale yellow or pinkish brown with small lenticels, and exudes when incised a fair amount of extremely bitter, brownish resin. The spiny fruit is borne on the under side of the branches; July–August.—Not common; in dense forest free from periodical inundations (alt. 500 ft.). Timber is used to a limited extent for general construction.

Wood creamy yellow throughout; odorless, but slightly bitter to taste; straight-grained; fine- to medium-textured; of medium weight; easy to cut, takes a smooth polish, and holds its place well when finished. Growth rings faintly visible owing to alinement of parenchyma which surrounds the pores, and is also in fine, short, tangential bands extending between the rays, at times in continuous, concentric bands which appear to indicate limitation of growth rings. Pores small; fairly numerous, well scattered; solitary, less frequently in radial, seldom tangential, multiples of 2–3; mostly open. Vessel lines fine, of same color as background or slightly darker, and visible in proper light. Rays fairly fine and evenly spaced; barely visible to unaided eye on cross and radial surfaces.

Loreto: upper Itaya, *3511*.

Ogcodeia Ulei (Warb.) Macbr. Field Mus. Bot. 11: 16. 1931.

Small tree, not exceeding 18 feet tall. Crown conical. Trunk erect, round, slender, and branching 3 or 4 feet from the ground. Bark pale gray or reddish brown and exudes a fair quantity of insipid, yellowish brown resin. Fruit round, borne in clusters on branches; October–November.—Not common; in dry loam in old clearings

and pastures (alt. 450 ft.). Timber sometimes used for general construction.

Sapwood constitutes most of the wood, pale yellowish brown and darkening slightly on exposure; heartwood dull brown. Wood odorless and tasteless; straight- or slightly wavy-grained; fine- or medium-textured; of light or medium weight; cuts easily, takes a smooth finish, and holds its place well. Growth rings faintly visible owing to slight variation in depth of color and arrangement of elements. Parenchyma surrounding the pores, sometimes in fine, concentric bands which appear to indicate limit of growth rings. Pores small; fairly numerous, uniformly distributed; solitary or, less frequently, in small radial multiples; mostly open. Vessel lines fine and barely visible without lens. Rays distinguishable without lens on radial surface.

Loreto: lower Huallaga, *5194*.

11. OLMEDIA Ruiz & Pavón

Olmedia aspera Ruiz & Pavón, Syst. Veg. 257. 1798. *Muichipata.*

Straggly tree, seldom more than 40 feet tall. Crown round or spreading. Trunk straight, cylindrical, 7 to 10 inches in diameter, and free of branches up to 18 feet. Twigs dark chocolate brown, glabrous. Bark pale pinkish or reddish brown; inner bark woolly. Flowers white; January–February.—Common in the vicinity of Tarapoto in fairly dense growth (alt. 1,400 ft.), and moderately abundant around San Roque (alt. 3,500 ft.) in dense forest.

Wood creamy yellow or pale brown, with extensive grayish areas caused by stain, and sometimes with dark purplish or brown streaks; odorless and tasteless; straight-grained; fairly coarse- or decidedly coarse-textured; of light or medium weight; easy to cut; checks in drying; not durable. Growth rings absent or present owing to tendency of pores to be arranged in concentric zones. Parenchyma in continuous or broken, coarse or fine, whitish, concentric bands, sometimes irregularly spaced. Pores of fairly small or medium size and at limit of vision; not numerous, diffuse- or ring-porous; solitary or in radial multiples of 2–5, seldom in small clusters. Rays fairly fine or moderately broad on cross section; fairly distinct at times on tangential; distinct on radial surface.

San Martín: Tarapoto, *6019, 6022, 6544;* San Roque, *7082.*

12. PEREBEA Aubl.

Perebea Chimiqua Macbr. Field Mus. Bot. 11: 63. 1931. *Chimiqua, Siparuna.*

Tree, approximately 35 feet in height. Crown spreading. Trunk erect, round, slender, and branching almost from the base. Bark pale grayish brown, with numerous small brown lenticels. Fruit round, small, red when mature, and edible; September–October.—Uncommon; in dry loam along margin of forest and in old clearings (alt. 400 ft.). Timber has no local application.

Sapwood yellowish or pale reddish brown; heartwood darker pinkish brown, thin. Wood odorless and tasteless; straight- or wavy-grained; medium- or rather coarse-textured; of medium weight; fairly easy to cut; checks in drying; susceptible to stain in drying; fairly durable. Growth rings absent or indistinct. Parenchyma paratracheal, aliform, or sometimes confluent; of lighter color than background and readily visible on moistened cross surface. Pores barely visible without lens; fairly numerous, well distributed; solitary and infrequently in small radial multiples or clusters; open. Vessel lines appear as fine scratches and are distinguishable owing to parenchyma sheaths. Rays fairly broad; visible without lens on cross and tangential sections; of darker color than background and rather distinct on radial surface.

Rays heterogeneous; 3–5 cells wide and few to 100 cells high. Wood fibers thin-walled, often septate.

Loreto: upper Itaya, *3412*.

13. POUROUMA Aubl.

Small or medium-sized trees, fairly common in some localities in old clearings. The foliage is similar to that of *Cecropia*, but the leaves are grayish rather than white beneath. Wood white with pale gray or brownish streaks; coarse-textured; light and soft; requires a sharp knife to cut smoothly across grain; perishable. Parenchyma paratracheal, sometimes aliform or confluent, and occasionally terminal. Pores large; few, well scattered; solitary or infrequently in radial or diagonal multiples of 2; open. Rays fairly broad on cross section; distinct on radial surface. Timber is not used locally except for kindling.

Pourouma cecropiaefolia Mart. Reise Bras. 3: 1130. 1831; Miq. in Mart. Fl. Bras. 4, pt. 1: 123. 1853. *Uvilla.*

Tree, about 45 feet in height. Crown round. Trunk bifurcated near the base; the larger limb straight, round, and about 8 inches in

diameter. Fruit ovoid, in clusters, black when mature; October–November.—Not common; in dry loam in old clearings (alt. 550 ft.).

Wood lustrous white throughout with occasional fine veining of the dark vessel lines; straight-grained; not as fibrous as *P. Ulei*. Growth rings sometimes present. Parenchyma paratracheal, aliform, sometimes uniting the pores, and in fairly continuous, concentric bands indicating limitation of growth rings; more prominent than in *P. Ulei*. Pores somewhat larger than in the last-named species; mostly solitary, also in small radial or diagonal multiples. Vessel lines coarse and long. Rays at limit of vision, but not prominent, on cross section; visible also in proper light on radial surface. Pith white, about 0.5 inch in diameter.

Loreto: upper Itaya, *3347*.

Pourouma Ulei Warb. Bot. Jahrb. 40: 132. 1907. *Sacha-uvilla, Uvilla.*

Tree, 35 to 55 feet tall. Crown open, almost flat, or round. Trunk cylindrical, straight or moderately straight, up to 12 inches in diameter, and free of limbs for 12 to 15 feet. Bark very thin, grayish brown, with coarse, shallow, rounded ridges, occasionally horizontally disposed; inner bark fibrous. Fruit round, black when mature, and edible; October–November.—Not common; in dry loam in clearings or along banks of streams (alt. 550 ft.).

Wood almost white throughout with occasional dark brown streaks; odorless and tasteless; straight-grained; saws woolly and takes a lustrous finish. Growth rings occasionally present owing to some variation in depth of color. Parenchyma surrounding the pores and at times in short, tangential bands. Pores of medium size; solitary, infrequently in small radial multiples. Vessel lines appear as long scratches; at times filled with black gum. Rays numerous and rather fine on cross section; barely visible without lens on radial surface; distinctly heterogeneous. Pith white, up to 0.75 inch in diameter, and septate.

Loreto: near Yurimaguas, *3984, 4627*.

14. PSEUDOLMEDIA Trécul

Small or large trees. Leaves leathery, oblong or lanceolate, entire, glabrous or nearly so. Flowers dioecious, the staminate in sessile, axillary heads, the pistillate solitary. Fruit small, ovoid, subtended by the broad persistent bracts. Timber is used for canoes and rollers for crushing sugar cane.

Sapwood whitish or pale pink with grayish cast; heartwood deep pinkish or dark chocolate brown. Wood has no distinctive odor or taste; coarse-textured; fairly light or moderately heavy; does not take a very smooth finish; fairly durable or durable. Parenchyma paratracheal, aliform, and in broken tangential bands uniting the pores. Pores of medium size or large; not numerous to numerous and diffuse; solitary or less frequently in multiples; mostly open. Rays fairly fine and sometimes wavy on cross section; distinct on radial surface.

Pseudolmedia multinervis Mildbr. Notizbl. Bot. Gart. Berlin 10: 189. 1927. *Itaúba amarilla.*

Forest tree, up to 140 feet or more in height. Crown spreading. Trunk moderately straight, round, 15 to 32 inches in diameter, clear of limbs for two-thirds the entire height and with large surface roots. Bark and heartwood yield a copious quantity of bitter, yellowish resin.—Not common; in dense, flood-free forest (alt. 550 ft.). Timber is esteemed for canoes and rollers for crushing sugar cane.

Sapwood yellowish brown with extensive grayish tinge; heartwood pinkish or dark brown, sometimes perishable. Wood straight- or slightly wavy-grained; of medium weight and strong; not difficult to work and holds its place well; susceptible to stain. Growth rings present, but poorly defined; visible owing to slight variation in depth of color. Parenchyma paratracheal. Pores at limit of vision; fairly numerous, well-scattered; solitary or in radial multiples of 2–3, seldom in small clusters; open. Vessel lines coarse, of light brown color; often filled with black gummy deposit. Rays at limit of vision on cross section; sometimes slightly darker than background on radial surface.

Loreto: near Yurimaguas, *4379.*

Pseudolmedia sp. *Loro-micunan.* Tree, up to 60 feet in height. Crown round. Trunk straight, columnar, up to 45 inches in diameter, unbranched for 20 feet, and with low buttresses. Bark up to 0.5 inch thick, dark brown, scaly, and yields a copious quantity of slightly bitter, pale yellow latex, known locally as "caucho-mashan," which is used to adulterate balata. The balata gatherers maintain that by the addition of this latex the consistency of balata is improved. Flowers small, yellow. Fruit small, round, green when mature; June–July.—Not common; in dense forest in "alturas" (alt. 500 ft.).

Wood pale yellow with grayish or black streaks; straight-grained; of medium weight; not difficult to work and takes a dull finish. Growth

rings sometimes present. Parenchyma surrounding the pores and in fine, irregular, tangential bands uniting them. Pores at limit of vision; not numerous, well distributed; solitary, in short radial multiples, or in small clusters; open or closed. Vessel lines fairly coarse, but not conspicuous; often filled with black gum. Rays moderately fine; sometimes discernible without lens on cross and tangential sections; of light brown color and distinct on radial.

Loreto: upper Nanay, *914*.

15. SOROCEA A. St. Hil.

Shrubs or small trees, fairly common in both the lowland and upland in second growth or forming undergrowth in dense forest. Timber is not used locally. Wood pale white or yellowish to pinkish or dark brown, often with pale or dark gray areas, caused by stain; fairly fine- or medium-textured; of light to medium weight; brittle, not difficult to work; not durable. Parenchyma paratracheal, indistinct, and in fairly fine or broad, concentric bands. Pores of medium size; not numerous, uniformly distributed; solitary or less frequently in multiples; open or closed. Rays moderately fine on cross section; occasionally visible without lens on radial.

Sorocea Briquetii Macbr. Candollea 4: 311. 1931.

Tall shrub. Crown dense and open. Trunk slender and unbranched for about 3 feet. Bark grayish or light brown, scaly, and with lighter brown lenticels; wood beneath bark dark brown. Fruit ovoid, green, and clustered; January–February.—Fairly common; in sandy loam among shrubs and low trees of secondary growth (alt. 1,500 ft.).

Sapwood white or pale brown; heartwood dark brown, perishable. Wood odorless and tasteless; straight-grained; medium-textured; of light or medium weight, strong, and tough; susceptible to insects. Growth rings absent or poorly defined. Parenchyma surrounding the pores and in wavy, continuous, concentric bands; readily visible on moistened cross section. Pores small; not numerous, have a tendency to concentric arrangement; in radial multiples or solitary; mostly open. Vessel lines fine, but discernible to unaided eye on account of brown gum frequently present. Rays numerous, fine, and distinguishable only with lens on cross and tangential sections; slightly darker than background and discernible to unaided eye on moistened radial surface.

San Martín: Rumisapa, near Tarapoto, *6803*.

Sorocea hirtella Mildbr. Notizbl. Bot. Gart. Berlin 10: 183. 1927.

Shrub, about 12 feet tall, with many branches. Trunk dividing from the base. Bark yellow or pale brown and with coarse lenticels. Flowers small, paniculate. Drupe subround or ovoid, and clustered. —Not common; forming undergrowth in dense, flood-free forest (alt. 400 ft.).

Sapwood yellowish or yellowish brown with extensive grayish areas; heartwood dark brown and perishable. Wood odorless and tasteless; straight- or irregular-grained; medium-textured; light in weight, but firm and strong; not difficult to cut and takes a fairly smooth finish; susceptible to stain in drying. Growth rings absent or poorly defined. Parenchyma visible to aided eye on moistened cross section as irregular, white, concentric bands. Pores small; few and well scattered; solitary, in small radial multiples, and less frequently in small clusters. Vessel lines fine, rather long, and of darker color than background. Rays fine, of lighter color than fibers, and faintly discernible without lens on cross section; distinguishable to aided eye on radial.

Loreto: Caballo-cocha, *2092*.

Sorocea muriculata Miq. in Mart. Fl. Bras. 4, pt. 1: 113. 1853.

Small shrub, 4 or 5 feet in height. Bark yellowish or pale brown and with small lenticels. Fruit small, round, brown, with a bluish cast; March–April.—Not common; along edge of path and forming undergrowth in dense, flood-free forest (alt. 450 ft.).

Wood whitish or pale yellow, with extensive grayish streaks; straight-grained; medium-textured; light in weight, but firm. Growth rings absent. Parenchyma visible to unaided eye. Pores small; few and scattered; solitary or in radial multiples of 2–5. Vessel lines fine, long, and of darker color than adjacent elements. Rays slightly darker than background and faintly discernible without lens on radial surface.

Loreto: near Iquitos, *8010*.

Sorocea opima Macbr. Field Mus. Bot. 11: 64. 1931.

Shrub, about 12 feet tall, with many branches. Trunk short and slender. Bark yellowish or pale brown with a light greenish cast, and small, scattered lenticels; secretes when cut a small amount of bitter, light brown resin. Fruit pale red, clustered; June–July.—Uncommon; in dry loam in dense forest (alt. 380 ft.).

Sapwood white or pale yellow when fresh, yellowish brown or light gray when dried; heartwood pale brown, thin, and not distinctly defined. Wood odorless and tasteless; straight-grained; medium-textured; of light weight; inclined to be fibrous, but not difficult to cut. Growth rings present owing to variation in abundance of parenchyma. Parenchyma readily discernible to unaided eye as broad concentric bands. Pores small, but visible with lens; few. Vessel lines fine and fairly discernible to unaided eye. Rays of light color on transverse section; faintly distinguishable without lens on cross and radial sections.

Loreto: Caballo-cocha, *2357*.

16. TROPHIS L.

Unarmed trees. Leaves entire or dentate and deciduous or persistent; sometimes used for fodder. Flowers dioecious, the staminate in long, slender catkins, the pistillate in spikes or racemes. Fruit a small drupe with scant flesh and containing a single seed.

Sapwood white to pinkish or pale brown; heartwood dark brown or almost black. Wood odorless and tasteless; medium- or coarse-textured; of medium density to heavy; inclined at times to be fibrous, not difficult to work; fairly durable to durable. Parenchyma in continuous or broken, tangential or oblique bands, rather few to numerous, and irregularly spaced, uniting the pores and often surrounding them. Pores of medium size to large; few to fairly numerous and well distributed; solitary, less frequently in small multiples; open or closed. Rays moderately fine to rather broad on cross section; indistinct on tangential; fairly distinct on radial surface.

Vessel-ray pits half-bordered. Rays heterogeneous; 3–5 cells wide; gum abundant in ray cells.

Trophis americana L., var. **meridionalis** Bur., ined.

Forest tree, from 36 to 45 feet in height. Crown spreading. Trunk straight, round, slender, and branching a few feet from the base. Bark grayish and fairly smooth. Leaves short-stalked, subleathery, smooth, entire or finely dentate, long-acuminate at apex. Fruit small, subround; October–November.—Not common; in fairly dense growth free from periodical inundations (alt. 500 ft.).

Wood white throughout when fresh, in dried material light brown with pale yellowish streaks; odorless and tasteless, straight-grained; medium-textured; harder, firmer, and more brittle than *T. racemosa;* not difficult to work, capable of taking a fairly smooth finish with a

moderate luster; checks in drying; appears to be durable and immune to stain. Growth rings present owing to variation in depth of color. Parenchyma paratracheal and uniting the pores in numerous, broken or continuous, concentric bands, of lighter color than background, and readily distinguishable on moistened surface. Pores of medium size; not numerous, well scattered; solitary or in radial multiples of 2–5, seldom tangentially disposed; open. Vessel lines appear as fairly long, distinct scratches of same color as background, but visible when held to proper light. Rays numerous, of same color as but finer than parenchyma bands, and readily discernible with lens on cross section; faintly discernible to unaided eye on moistened tangential and radial.

Loreto: Puerto Arturo, lower Huallaga, *5243*.

Trophis racemosa (L.) Urb. Symb. Antill. 4: 195. 1905. *Cuchara-caspi, Sinchi-caspi, Urpai-manchinga.*

Small tree, seldom exceeding 25 feet in height. Crown open. Trunk straight, round, slender, and undivided up to 7 feet. Bark grayish or lavender-colored, with deep yellowish brown incrustations, and secretes when cut a fair quantity of viscid, insipid latex. Leaves alternate, entire or slightly serrate, smooth, and leathery or moderately so. Flowers dioecious, in small heads, and axillary. Fruit a small achene, deep brown when mature.—Widely distributed in the lowland and sometimes encountered in the highland (up to 1,300 ft. alt.); usually in dry medium loam along edge of paths and in fairly dense growth.

Sapwood variable in color from pale yellow to deep brown, usually streaked, and with extensive grayish areas caused by sapstain; heartwood dark brown. Wood odorless and tasteless; straight- or fairly straight-grained; medium- to rather coarse-textured; light to fairly heavy; slightly fibrous, takes a fairly smooth finish with a moderate to high luster, and holds its place well when finished. Growth rings present owing to variation in abundance of parenchyma, which is in numerous, wavy, broken or continuous, closely spaced, concentric bands, almost white in color and readily discernible. Pores of medium size; few; solitary or in radial rows of 2–4. Vessel lines fairly fine and slightly darker than background. Rays fine, numerous, of same color as parenchyma bands, and visible with lens on cross section; dark or almost black and distinguishable to aided eye on tangential; indistinct on radial. Pith canary yellow, narrow.

Loreto: lower Itaya, *201;* Caballo-cocha, *2086*(?); lower Huallaga, *4658.*—San Martín: near Tarapoto, *6573.*

17. TRYMATOCOCCUS Poepp. & Endl.

Trymatococcus amazonicus Poepp. & Endl. Nov. Gen. & Sp. 2: 30. *pl. 142.* 1838.

Small or medium-sized tree, from 20 to 50 feet in height. Crown spreading; lateral branches elongate and pendent. Trunk straight, round, up to 12 inches in diameter, and either branching from the base or undivided up to 12 feet. Bark grayish brown or chocolate-colored, with small excrescences or numerous small fissures.—Common throughout the lowland; in dry medium loam along margin of dense growth and in open patches in flood-free forest (alt. 400–500 ft.).

Sapwood pale yellow when fresh, turning to pale or medium brown after long exposure; some specimens have pinkish red or grayish streaks; heartwood dark purple and perishable. Wood sometimes slightly fragrant, but tasteless; of fairly light or medium weight; straight-grained; medium-textured; easy to work, takes a smooth finish; susceptible to insect attacks. Growth rings absent or present owing to variation in depth of color. Parenchyma in association with and filling the pores, also aliform, and sometimes confluent (in *No. 2965,* labeled *T. amazonicus,* but which is doubtful, parenchyma is in conspicuous, pale yellow, broken or continuous, wavy, concentric bands). Pores fairly small; moderately numerous, well scattered; solitary; closed. Vessel lines short, fine, and slightly darker than background on account of parenchyma sheaths. Rays fine, numerous, and visible with lens on all surfaces. Pith yellowish or grayish white and narrow.

Loreto: Pebas, *1882;* La Victoria, *2965*(?); near Iquitos, *3735, 3767;* near Yurimaguas, *3875, 4525.*

URTICACEAE. Nettle Family

Small trees, shrubs, or herbs, often armed with stinging hairs. Leaves alternate or opposite, entire or toothed, often with pale, linear or dot-like cystoliths. Flowers small, greenish, usually of separate sexes, without petals. Fruit small, 1-seeded, dry or fleshy. Their timbers have no local value.

Woods pale white or cream-colored, darkening on exposure, and stain readily in drying; heartwood sometimes well defined, reddish brown. Wood odorless and tasteless; fairly fine- or coarse-textured;

light in weight and soft or moderately firm; often fibrous and requires a sharp knife to cut smoothly across grain; perishable. Some of the woods are of unusual interest because of the presence of island type of included phloem, for example, in *Myriocarpa* and *Urera*. Parenchyma sparsely developed; paratracheal and indistinct with lens. Pores fairly small or large; not numerous and usually well scattered; solitary or in radial multiples; open or closed. Rays broad on cross section; most often indistinct on tangential; fairly distinct to conspicuous on radial surface.

Vessel perforations exclusively simple; intervascular pits often large, elongated, irregularly disposed, and bordered; vessel-ray pits simple or half-bordered. Rays heterogeneous; up to 15 cells wide and few to 50 cells or more high; cells often elongated vertically. Wood fibers fairly thin-walled.

1. BOEHMERIA Jacq.

Boehmeria pallida (Rusby) Killip, Journ. Wash. Acad. Sci. 21: 347. 1931.

Small tree, seldom more than 20 feet in height. Crown spreading. Trunk slender, cylindrical, often inclined, and branching from near the base. Leaves petiolate, narrowly ovate or lanceolate, dentate, acuminate, acute at base. Flowers greenish. Fruit a small achene. —Abundant; among shrubs and low trees and in abandoned land (alt. 1,400 ft.); reported in the highland at La Merced, Department of Junín (alt. 2,200 ft.), among thickets, and in the Department of Ayacucho (alt. 3,000 ft.), in open woods.

Sapwood highly lustrous, variable from pale pink to grayish owing to sapstain, and darkening to pale brown on exposure; heartwood reddish or chocolate brown, thin. Wood odorless and tasteless; straight- or fairly straight-grained; fairly fine- or medium-textured; light, but firm; fibrous, easy to cut, takes a moderately smooth finish; checks in drying; not durable. Growth rings present owing to variation in color and arrangement of elements. Parenchyma paratracheal; indistinct. Pores of medium size; not numerous and show a tendency to crowd; solitary or in radial multiples of 2–3, rarely more; open. Vessel lines appear as short or fairly short, dark scratches. Rays fairly broad and evenly spaced on cross section; distinguishable on tangential; producing a silver grain on radial surface; heterogeneous; 3–4 cells wide; cells elongated vertically.

San Martín: Tarapoto, *5772*.

2. MYRIOCARPA Benth.

Myriocarpa densiflora Benth. Bot. Voy. Sulph. 169. 1844. *Ishanga.*

Tree, about 25 feet tall. Crown spreading. Trunk straight, cylindrical, slender, and branching from near the base or clear of limbs up to 15 feet. Bark dark purplish brown, with low, short ridges. Leaves armed with grayish, stinging hairs. Flowers white or greenish white, minute, long-pedicellate, and axillary; December–January. Fruit a small achene.—Fairly common; in humid loam in clearings and along banks of streams (alt. 400–1,400 ft.); reported also in dense forest in the Paucartambo Valley (alt. 2,300 ft.), at La Merced, and near Pampayaco, Department of Huánuco. Timber is employed for kindling.

Sapwood oatmeal-colored or yellowish brown to dark gray, often with lighter-colored to dark purplish brown streaks, caused by sapstain; heartwood pinkish brown, perishable. Wood odorless and tasteless; straight-grained; medium- or very coarse-textured; light or moderately light in weight, firm, and brittle; requires a sharp knife to cut smoothly across grain; susceptible to insect attacks. Growth rings absent or indistinct. Parenchyma paratracheal, indistinct. Pores fairly small to large; not numerous, well distributed; solitary or less frequently in radial multiples of 2–3, seldom tangentially disposed; open or sometimes closed. Vessel lines long and conspicuous owing to their darker color than background. Rays broad on cross section; indistinct on tangential; fairly distinct on radial. Included phloem, of island type, comprises about half the area on cross section.

Intervascular pits large, irregularly disposed; vessel-ray pits bordered or half-bordered. Rays heterogeneous.

Loreto: lower Nanay, *414.*—San Martín: Tarapoto, *6145; 6576.*

3. URERA Gaud.

Urera caracasana (Jacq.) Gaud. ex Griseb. Fl. Brit. W. Ind. 154. 1859. *Ishanga blanca, Ishanga del agua.*

Shrub or small tree, up to 35 feet in height. Crown spreading. Trunk straight or moderately so, round, up to 10 inches in diameter, and unbranched for 10 feet. Bark purplish brown with a grayish tinge; wood beneath bark has a reddish pink cast. Leaves alternate, long-stalked, toothed; an infusion obtained by boiling the leaves is said to be used in native medicine. Flowers small, greenish,

in axillary panicles. Achene surrounded by the fleshy, enlarged calyx, the whole resembling a juicy fruit, bright red when mature. —Very common throughout the lowland; in sandy or dry medium loam in thickets or along margin of forest.

Wood creamy yellow with purplish and dark gray patches; odorless and tasteless; straight-grained; medium-textured; very light or fairly light in weight; very difficult to cut smoothly across grain and does not take a smooth finish; perishable. Parenchyma paratracheal; indistinct. Pores of fairly small or medium size; not numerous, well distributed; solitary or in radial multiples of 2–3, less often tangentially disposed and in small clusters; open or filled with black gum. Vessel lines coarse and long. Rays fairly broad and slightly lighter-colored than fibers on cross section; fairly distinct on radial and sometimes on tangential; up to 15 cells wide and 50 cells or more high. Ripple marks present, not very distinct; not all elements storied; number per inch length, up to 112.

Intervascular pits large, with ellipsoid margins; vessel-ray pits simple. Rays heterogeneous.

Loreto: lower Huallaga, *4288, 4796, 4945;* herbarium material collected also in the lower, middle, and upper Nanay, at Pebas, and La Victoria.

Urera caracasana var. **Miquelii** Wedd. ex DC. Prodr. 16, pt. 1: 90. 1869. *Ishanga.*

Small tree, 30 feet in height. Crown spreading. Trunk straight, round, 6 inches in diameter, and free of branches for 3 feet. An infusion obtained by boiling the leaves is said to be used as a remedy for fevers.—In dry loam in abandoned land (alt. 450 ft.).

Loreto: Fortaleza, lower Huallaga, *4308.*

PROTEACEAE. Protea Family

Trees or shrubs. Leaves alternate, opposite or verticillate, simple or compound, entire or dentate, and without stipules. Flowers in axillary or terminal racemes, spikes, or heads. Fruit a capsule or drupe, dehiscent or indehiscent.

The woods are oatmeal-colored, yellowish to pale pinkish brown with a grayish hue, often with darker markings of rays; heartwood sometimes well defined and darker brown; odorless and tasteless; fairly fine- to rather coarse-textured; of medium weight to heavy; not very easy to work; mostly durable, often exhibiting considerable beauty.

The woods are characterized by conspicuously broad oak-like rays which show on the tangential surface as spindle-shaped masses. Parenchyma abundantly developed; in tangential lines extending in hammock-like arrangement between the rays, also paratracheal, aliform, or confluent. Pores fairly small to rather large; not numerous, diffuse- or in *Panopsis* showing a tendency to ring-porous, and often associated with parenchyma in concentric bands or in scallops; solitary or in multiples, seldom in rows or small clusters; lustrous tyloses common. Oil cells appear to be present in the rays in *Embothrium* and *Roupala*. The woods of this family suggest the Dilleniaceae, but differ from this group in the characteristic arrangement of the parenchyma and pores.

Vessel perforations are exclusively simple; intervascular pits often small, crowded, with anastomosing apertures; vessel-parenchyma pits very small, half-bordered. Rays mostly homogeneous; up to 10 cells or more wide. Wood fibers thick-walled; pits with circular borders and slit-like apertures.

1. EMBOTHRIUM Forst.

Embothrium Weberbaueri Perk. Bot. Jahrb. 45: 434. 1911.

Shrub, 12 or 15 feet in height. Bark thin or moderately so, dark greenish brown, and fairly smooth. Leaves simple, alternate, ovate or elliptic, acute at base, blunt or acuminate at apex, nearly glabrous, and with slender petiole. Flowers racemose, long, and slender. Fruit dark brown or almost black; February–March.—Fairly common; in dry loam in old clearings (alt. 3,500 ft.).

Wood oatmeal-colored or pale pink, with darker markings of rays; odorless and tasteless; straight- or roey-grained; medium- and uniform-textured; moderately light in weight, but strong; fairly or highly lustrous when held to proper light. Growth rings absent or poorly defined. Parenchyma paratracheal and in numerous, undulating, fairly fine, evenly spaced lines or bands extending hammock-like between the rays and uniting the pores. Pores fairly small or medium-sized; not numerous and show tendency to tangential alinement; solitary, but mostly in tangential multiples or rows of 2–5, infrequently in small diagonal or radial multiples or in small clusters; open or closed. Vessel lines short or long, visible, but not distinct, to unaided eye, and slightly darker than background. Rays very distinct or conspicuous on all surfaces; heterogeneous. Oil cells appear to be present in rays.

San Martín: San Roque, *7320*.

2. PANOPSIS Salisb.

Panopsis rubescens Ducke, var. **simulans** Macbr. Field Mus. Bot. 11: 67. 1931.

Straggly tree, about 15 feet in height. Crown spreading. Trunk fairly round and 5 inches in diameter. Bark about 0.25 inch thick, pinkish or reddish brown, scaly, and when cut exudes an abundance of insipid, red resin. Leaves simple, entire, coriaceous, pinnate-nerved. Flowers golden brown, in racemes; May–June. Fruit nut-like, with a thick, woody pericarp, 1-seeded.—Uncommon; aquatic or in dense forest in the vicinity of streams (alt. 450 ft.).

Wood yellowish, pinkish, or reddish brown, sometimes with short black streaks, and not sharply demarcated into sap and heart; odorless and tasteless; fairly straight-grained; medium- or moderately coarse-textured; of medium weight; harsh, rather fibrous, not easy to cut, and does not take a smooth finish; very durable. Growth rings apparently absent. Parenchyma paratracheal and in numerous, wavy lines extending hammock-like from ray to ray. Pores of medium size and distinguishable only with lens, or large and readily visible to unaided eye; not numerous, well scattered or showing tendency to ring-porous; solitary or in tangential multiples. Vessel lines fine, of same color as background, but discernible without lens; tyloses sometimes present. Rays large and conspicuous on all sections; lighter in color than fibers on cross section, but darker on other surfaces, producing an oak-like figure on radial surface; homogeneous; 10 cells or more wide.

Loreto: upper Nanay, Timbuchi, *1044;* Manfinfa, *1121.*

3. ROUPALA Aubl.

Leaves alternate, simple or pinnate, entire or dentate, petiolate. Flowers hermaphrodite. Capsule 2-seeded.

Wood white when fresh, but turns to pinkish brown, with a grayish cast, on exposure to sunlight; medium- to rather coarse-textured; very heavy, hard, and compact; not easy to work; highly durable and is employed for exposed construction. Parenchyma abundantly developed and distinct; in tangential lines or fine bands between the rays and often enveloping the pores. Pores fairly small to medium-sized; moderately numerous; in tangential multiples, rarely solitary or in clusters, attached to the "under" side of the parenchyma lines; mostly filled with lustrous tyloses. Rays conspicuous on all surfaces; oil cells common in ray cells on radial surface.

Vessels with simple perforations; intervascular pits minute, crowded, and with anastomosing apertures. Fibers thick-walled; pits small, with slit-like apertures.

Roupala complicata HBK. Nov. Gen. & Sp. 2: 153. 1817. *Ingaina.*

Glabrous tree, about 25 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched for 17 feet. Bark reddish brown and scaly. Leaves ovate, long-attenuate or -acuminate, glabrous. Flowers with greenish white sepals and white petals; January–February.—Not common; in sandy loam among low trees and shrubs of secondary growth (alt. 1,500 ft.).

San Martín: Morales, near Tarapoto, *5703*.

Roupala Dielsii Macbr. Field Mus. Bot. 11: 65. 1931.

Tall forest tree, from 70 to 80 feet in height. Crown spreading or pyramidal. Trunk straight, cylindrical, 12 to 18 inches in diameter, and unbranched for 15 feet. Bark about 0.25 inch thick, pinkish or reddish brown, and scaly; inner bark with numerous, short, sharp ridges, with corresponding depressions on the wood surface beneath the bark. Leaves membranaceous and serrate. Flowers small, in slender lateral spikes; April–May.—Uncommon; in dense, periodically inundated forest (alt. 400 ft.). Timber employed for general carpentry and uses requiring durability and strength.

Wood when freshly cut almost white, when dried pinkish brown with grayish cast and brown markings of rays and occasional purplish brown areas, and with no clear demarcation between sap and heart; odorless and tasteless; straight- or wavy-grained; medium- or rather coarse-textured; very heavy, hard, and compact; difficult to work and does not take a smooth finish; durable. Growth rings absent or poorly defined. Parenchyma in fairly regularly spaced, wavy lines or bands extending between the rays and sometimes enveloping the pores; visible to unaided eye on longitudinal surfaces. Pores small or medium-sized; fairly numerous and at times crowded; mostly in tangential multiples of 2–4, less frequently solitary; open or closed. Vessel lines visible on account of grayish white or pale yellow parenchyma sheaths. Rays broad and conspicuous on cross section; prominent on tangential; high and producing a conspicuous and characteristic oak-like figure on radial surface.

Loreto: lower Itaya, *114*.

OLACACEAE. Olax Family

Shrubs or small trees. Leaves alternate, entire, without stipules. Flowers small or medium-sized, borne singly or in clusters in the leaf axils. Fruit a drupe. The timbers are of little economic importance.

Woods white or pale yellowish, often with a bluish gray stain, to variegated pale brown; heartwood light to dark brown. Wood odorless and tasteless; fine- to fairly coarse-textured; mostly of medium density to fairly heavy or heavy, hard, and compact; inclined to be fibrous, but easy to cut; some of the *Heisteria* species are durable. Parenchyma in numerous, broken or continuous, tangential or concentric bands or lines; in *Aptandra* and *Liriosma* producing a hoary effect when seen under lens. Pores fairly small or rather large; moderately numerous or numerous and well scattered; solitary, in multiples, or in rows; open or closed. Rays fairly fine (seldom moderately broad in *Liriosma*), numerous, and wavy on cross section; indistinct on tangential; sometimes fairly distinct on radial surface in *Heisteria;* brown specks of gum abundant in ray cells, especially on radial surface, and also in pith.

Vessel perforations mostly simple or scalariform; vessel-ray pits often very large, rounded or elongated, simple to half-bordered. Rays heterogeneous; multiseriate. Wood fibers often thick-walled and with inconspicuous, simple pits.

1. APTANDRA Miers

Aptandra Spruceana Miers, Ann. Mag. Nat. Hist. II. 7: 202. 1851. *Pamashto, Trompo-huayo.*

Tree, 40 to 60 feet in height. Crown spreading. Trunk straight, round or moderately so, 10 to 15 inches in diameter, and either branching a few feet from the ground or undivided up to 40 feet. Bark pale gray or dark brown with small, darker-colored lenticels. Flowers small, pale yellow or white; July–September. Fruit ovoid, yellow and edible when mature.—Fairly common in the lowland (alt. 400–500 ft.); in open dry loam or among trees of second growth, occasionally in forest in humid loam or adjacent to streams.

Wood creamy yellow with extensive dark gray areas; odorless and tasteless; fairly straight- or irregular-grained; medium-textured; of medium weight to fairly heavy; not difficult to work, takes a smooth finish, and holds its place well. Growth rings absent or poorly defined. Parenchyma in numerous, fine, short lines, extending tangentially or diagonally between the rays; of lighter color than

adjacent elements and producing a hoary effect when seen under lens. Pores of medium size and at limit of vision; not numerous, well distributed; solitary, but more frequently in small radial multiples or rows; open. Vessel lines indistinct to readily discernible owing to black gum present. Rays fairly fine, numerous, closely spaced, and sinuous on cross section; visible also with lens on other surfaces; heterogeneous.

Loreto: Yurimaguas, lower Huallaga, *4550, 4798.*

2. HEISTERIA Jacq.

Small or medium-sized trees or shrubs in which the calyx is enlarged and red in fruit. Very common throughout the lowland and occasionally in the upland. Timber is little used locally except for kindling.

Sapwood yellowish, pinkish, or pale brown, often with a grayish tinge; heartwood pale to dark brown and often susceptible to termite attacks. Wood fairly fine-textured; of medium weight to very heavy, hard, compact, and durable; fairly easy to work. Parenchyma metatracheal; in evenly or unevenly spaced, broken or continuous, concentric bands and in fine, often indistinct, irregular, tangential or oblique lines. Rays fairly fine, numerous, and sinuous on cross section; indistinct on tangential; sometimes fairly distinct on radial surface.

Heisteria cauliflora Smith in Rees, Cycl. 17. No. 2. 1802–20. *Huangana-caspi, Huapapa-caspi, Platina-caspi.*

Small tree, 10 to 25, at times up to 40 or 50, feet in height. Crown spreading. Trunk straight or moderately so, round, slender, and unbranched for 6 to 22 feet. Bark light tan, dark chocolate brown, or almost black, and with rather coarse lenticels. Flowers pale red with white stamens; March–May. Fruit round or subround, pale yellow; October–December.—Very common throughout the lowland (alt. 400 ft.); in old clearings, sometimes forming undergrowth in dense forest, and often in humid, heavy loam adjacent to streams.

Sapwood pale brown; heartwood medium or dark brown. Wood odorless and tasteless; straight- or interwoven-grained; fairly fine-textured; of medium weight to rather heavy; moderately easy to work and holds its color well; immune to stain, but susceptible to insect attacks. Growth rings absent or present owing to some differences in depth of color. Parenchyma in extremely numerous, fine, tangen-

tial or diagonal lines extending between the rays and barely visible with lens on moistened surface. Pores fairly small; numerous, uniformly distributed; solitary or less frequently in radial multiples of 2. Vessel lines indistinct. Rays numerous, fine, sinuous, and discernible with lens on cross section; indistinct on tangential; barely distinguishable to aided eye on radial surface; small brown specks of gum common in cells, especially on radial section. Pith yellowish brown and with scarlet globules of gum.

Rays distinctly heterogeneous; multiseriate and very high.

Loreto: lower Itaya *18, 25, 26;* lower Nanay, *834, 836;* upper Nanay, *996, 1034;* La Victoria, *2957;* Yurimaguas, lower Huallaga, *4161;* Puerto Arturo, lower Huallaga, *5191;* near Iquitos, *8058.*

Heisteria cyanocarpa Poepp. & Endl. Nov. Gen. & Sp. 3: 35. *pl. 240.* 1845.

Small tree or tall shrub, 10 to 15, at times up to 30, feet in height. Crown spreading. Trunk straight, round, slender, and unbranched up to 8 feet. Bark muddy gray or almost black and fairly smooth. Flowers small, white; July–September. Fruit small, round or ovoid, with red, persistent calyx cup.—Common in the lower Peruvian Amazon region (alt. 380 ft.); in open dry loam among shrubs and low trees, sometimes forming undergrowth in dense forest.

Sapwood pale pinkish or medium brown; heartwood dull medium brown. Wood without distinctive odor, but sometimes faintly bitter; fairly straight- or interwoven-grained; moderately fine- or medium-textured; easy to cut; checks in drying; appears to be durable. Growth rings absent or present owing to variation in abundance of parenchyma, the last barely visible with lens. Pores small; rather numerous; solitary or less frequently in radial multiples of 2–3 or more. Rays of lighter color than background and sometimes faintly visible to unaided eye on moistened cross section; indistinct or visible with lens on moistened radial surface; small dark brown specks of gum present in cells and discernible under lens on radial section. Pith yellowish brown and with abundant globules of dark brown gum.

Loreto: lower Itaya, *86;* Pebas, *1572;* Caballo-cocha, *2038;* La Victoria, *2745, 2808, 2949, 3169.*

Heisteria densifrons Engler in Mart. Fl. Bras. 12, pt. 2: 17. 1872. *Parinari.*

Tree, 45 feet in height. Crown flat. Trunk straight, round, slender, and unbranched for 10 feet. Bark pale chocolate brown,

fairly thin, and smooth. Fruit ovoid, moderately small; July–August.—Of limited distribution; in dry loam in fairly dense forest clear of seasonal floods (alt. 450 ft.).

Wood uniform pinkish or light brown; odorless, but has a slightly sweet taste; straight-grained; moderately fine- or medium-textured; heavy, hard, and flinty; inclined to be splintery, but takes a fairly smooth finish; checks in drying; immune to insects and stain and is probably durable. Growth rings present, but not distinct; visible owing to variation in abundance of parenchyma. Pores small; not numerous; mostly solitary. Rays discernible with lens on cross section; faintly visible without lens in proper light on radial surface; small, pale to dark brown specks of gum present in cells on radial section and distinguishable with lens.

Loreto: Paraíso, upper Itaya, *3379*.

Heisteria pallida Engler in Mart. Fl. Bras. 12, pt. 2: 16. 1872. *Chuchuhuasha*.

Tree, 30 or 40 feet in height. Crown round or spreading. Trunk straight or moderately so, round, 7 or 8 inches in diameter, and unbranched for 4 to 25 feet. Bark variable in color from pale gray to pinkish or medium brown; inner bark chocolate brown. Flowers small, white; December–January.—Fairly common in the lower Huallaga and most abundant in the region of Tarapoto (alt. 400–1,500 ft.); usually in sandy or dry medium loam among low trees. The bark pared from the roots and lower part of the trunk is pulverized, boiled in water, and the resulting infusion is reputed to be esteemed locally as a remedy for rheumatism and other muscular pains.

Sapwood pale brown and darkening slightly on exposure; heartwood medium brown. Wood odorless and tasteless; straight- or interwoven-grained; fine- to medium-textured; moderately heavy, rather hard, and brittle; not very difficult to work, takes a smooth finish, and holds its place well; susceptible to insect attacks, but immune to stain, and appears to be fairly durable. Growth rings present owing to alinement of parenchyma. In some specimens, the parenchyma appears as fine, broken or fairly continuous, concentric bands, of lighter color than the adjacent elements and faintly visible without lens, in others as numerous, fine, tangential lines extending between the rays. Pores small; not very numerous; mostly solitary. Rays numerous, fine, and visible to aided eye on cross and radial sections.

Loreto: Yurimaguas, lower Huallaga, *4924*.—San Martín: Tarapoto, *5813*, *5966*, *6719*.

3. LIRIOSMA Poepp. & Endl.

Tall shrubs with whitish or pale brown wood, often stained dark gray. Wood fine-textured; of fairly light or medium weight; easy to cut; not durable. Parenchyma in concentric or broken, tangential lines extending between the rays and producing a hoary effect when seen under lens. Pores minute or small; not numerous and well scattered; solitary; open or closed. Rays moderately fine or fairly broad on cross section; indistinct on other surfaces.

Liriosma gracilis A. C. Smith, Bull. Torrey Club 58: 91. 1931.

Straggly shrub, up to 10 feet tall. Bark dark brown, fairly smooth; inner bark fibrous. Flowers bright yellow. Fruit ovoid, orange-yellow; May–June.—In sandy loam along margin of dense forest (alt. 500 ft.).

Wood grayish brown with long, yellowish white streaks; interlocked-grained; fine- and uniform-textured; dense and firm. Growth rings distinguishable owing to some variation in abundance of parenchyma. The last in numerous, fine, irregular lines, producing a hoary effect on cross section. Pores minute. Vessel lines indistinguishable to unaided eye. Rays faintly visible without lens on cross section; indistinguishable on other surfaces.

Loreto: lower Nanay, *659*.

Liriosma Spruceana Engler in Mart. Fl. Bras. 12, pt. 2: 24. 1872.

Shrub, about 15 feet in height. Crown dense, open. Trunk straight and slender.—Not common; in forest free from seasonal floods (alt. 380 ft.).

Wood pale yellowish white with extensive dark gray streaks caused by stain; of medium weight; slightly coarser-textured than *L. gracilis*, and rays somewhat more pronounced on cross section than in the last-named species.

Loreto: La Victoria, *2532;* collected also in the lower Huallaga.

POLYGONACEAE. Buckwheat Family

Trees, shrubs, or herbs. Leaves alternate, entire, and usually provided with sheathing stipules (ocreae). Flowers mostly very small, with a green or colored perianth of 4–6 segments. Fruit a

compressed or 3-angled achene. The timbers are of no economic importance and are little used locally.

Sapwood variegated in color from oatmeal or yellowish to pale pinkish brown; heartwood pinkish, reddish, or chocolate brown. Wood fine- or medium-textured; of light weight to rather heavy; the wood of *Coccoloba* and *Triplaris* is inclined to be fibrous or splintery, easy to work, not durable, and susceptible to insect attacks, while that of *Symmeria* is very durable, not easy to work, and takes a smooth, fairly lustrous polish. Parenchyma indistinct or in fine or broad and distinct, irregularly spaced, tangential or concentric bands, sometimes enveloping the pores. Pores small to rather large; few to fairly numerous and mostly diffuse; solitary or in radial multiples, infrequently in small radial rows or in clusters. Rays on cross section fine and numerous in *Coccoloba* and *Triplaris*, moderately broad in *Symmeria* and visible also on tangential; fairly distinct to distinct on radial surface.

Vessel perforations exclusively simple; intervascular pits comparatively large, elongate or screwhead type; vessel-ray pits half-bordered with transitions to simple. Rays mostly homogeneous; 1 or 2 cells wide; cells sometimes coarse and gummy. Wood fibers with numerous simple or indistinctly bordered pits; in *Triplaris* often chambered and containing small rhombohedral crystals. Chambered parenchyma strands with large crystals also common.

1. COCCOLOBA L.

Trees or shrubs with persistent, usually thick and leathery leaves. Flowers small, green or pinkish, in long racemes or spikes; the calyx becoming enlarged and fleshy in fruit, resembling a berry. The mature fruit is juicy and has a rather agreeable flavor.

Sapwood whitish or pale pinkish brown, often with dark gum striping and gray streaks caused by sapstain; heartwood darker brown. Wood fine- or medium-textured; of fairly light to medium weight; inclined to be splintery, but easy to work, and takes a high polish; susceptible to insect attacks, but fairly durable in contact with moisture. Parenchyma indistinct or in broad, irregularly spaced, concentric bands of grayish white color. Pores mostly of medium size; few or fairly numerous and well scattered; solitary or in small radial multiples, seldom in small radial rows or small clusters; often filled with dark gum. Rays fine or fairly fine and numerous on cross section; indistinct on tangential; moderately distinct on radial.

Vessels with simple perforations; intervascular pits usually of screwhead type, rather large and crowded; vessel-ray pits half-bordered. Rays heterogeneous to homogeneous; uniseriate or less often biseriate. Wood fibers with minute, simple or indistinctly bordered pits. Chambered parenchyma strands with large crystals common.

Coccoloba Barbeyana Lindau, Bot. Jahrb. 13: 185. 1890.

Tree, up to 90 feet or more in height. Crown spreading. Trunk straight, fluted, 14 to 26 inches in diameter, and free of branches for about 36 feet. Bark moderately thick, coarse, and dark reddish brown. Fruit globular, black when mature.—Of limited distribution; in clearings (alt. 500 ft.). Timber is used for general carpentry.

Wood light brown or pale purplish brown with dark streaks; odorless and tasteless; straight- or moderately straight-grained; medium-textured; moderately heavy and strong; takes a fairly smooth finish; fairly durable. Growth rings indistinct or absent. Parenchyma indistinct. Pores small or barely at limit of vision; fairly numerous, not crowded; solitary or in radial multiples of 2–4, infrequently in small clusters; mostly open. Vessel lines short and faintly discernible owing to dark gum often present. Rays indistinct or visible only with lens on cross and tangential sections; barely at limit of vision on moistened radial surface.

Loreto: Puerto Arturo, lower Huallaga, *5138*.

Coccoloba gracilis HBK. Nov. Gen. & Sp. 2: 176. 1817.

Shrub or small tree, 15 feet tall. Trunk stout. Bark dark chocolate brown. Fruit small, rounded, pale red when mature.—Fairly abundant; in humid loam and along banks of streams (alt. 380 ft.). Wood is used mainly for kindling.

Sapwood distinctly defined, lustrous pinkish brown, and darkening to reddish brown on exposure to air; heartwood dull brown.

Loreto: Caballo-cocha, *2482*.

Coccoloba peruviana Lindau, Bot. Jahrb. 13: 213. 1890. *Cunchu-caspi*.

Shrub, up to 12 feet in height. Bark thin, fairly smooth, and pinkish brown. Fruit small, ovoid, pale yellow when mature; January–February.—Common in the middle Huallaga; in dense forest (alt. 1,600 ft.). Wood is used mostly for fuel.

Sapwood not distinctly demarcated, grayish brown, and darkening considerably to uniform brown when exposed to air; heartwood

dull brown. Wood straight- or roey-grained; finer-textured than *C. Barbeyana*. Growth rings present.

San Martín: Juan Guerra, *6852*.

Coccoloba Williamsii Standl., ined. *Palometa caspi, Tangarana mashan.*

Forest tree, 40 to 55 feet tall. Crown dense, open or round. Trunk straight, cylindrical, 8 to 15 inches in diameter, and branching from near the base. Bark grayish or dark brown to black, rough. Fruit purplish when mature; June–July.—Common in the lowland; most often in open patches (alt. 500 ft.). Wood is used extensively for fuel.

Sapwood variegated yellowish brown with extensive grayish cast or dark streaks; heartwood dull light brown or pale grayish purple. Wood lighter in weight than *C. Barbeyana*, not as durable, and liable to be damaged by insects.

Loreto: lower Nanay, *673;* Caballo-cocha, *2423;* lower Huallaga, *4597*.

2. SYMMERIA Benth.

Symmeria paniculata Benth. Lond. Journ. Bot. 4: 630. 1845. *Tangarana.*

Shrub, but said to attain the dimensions of a medium-sized tree. Bark light brown and fairly smooth. Leaves alternate, the petioles lined with 2 membranous, wing-like, overlapping margins. Inflorescence panicled; flowers in clusters.—Not common; in fairly dense forest subject to seasonal floods (alt. 400 ft.).

Sapwood indistinctly demarcated, yellowish or light brown with a pale grayish tinge; heartwood pinkish, reddish, or chocolate brown. Wood odorless and tasteless; straight- or wavy-grained; fine- or fairly fine-textured; of light weight to fairly heavy; easy to cut, takes a smooth finish with a moderate luster. Growth rings present, but not well defined. Parenchyma indistinct. Pores small; not very numerous, well scattered; solitary or less often in radial multiples of 2–3, infrequently diagonally or tangentially disposed. Vessel lines short, fine, of same color as background, but visible without lens. Rays broad, widely spaced, lighter-colored than adjacent fibers, and prominent on transverse section; discernible on tangential; conspicuous and producing a characteristic figure on radial surface.

Loreto: lower Itaya, *101*.

3. TRIPLARIS Loefl.

Medium-sized or fairly tall trees of rapid growth, often growing in old clearings, and of unusual interest because their hollow trunks and branches are occupied by venomous ants, known locally as "tangarana," which rain down on an intruder upon contact with the tree. Leaves alternate, entire, penninerved; stipules deciduous, leaving ring-like scars. Flowers dioecious; calyces shuttlecock-like, usually pinkish, and conspicuous from afar.

Sapwood oatmeal-colored or yellowish brown and rather lustrous; heartwood yellowish with a reddish tinge. Wood rather fine- to medium-textured; fairly light but firm to medium in weight; fibrous, easy to work, finishes smoothly, takes a good polish; not durable. Parenchyma paratracheal and metatracheal and usually sparingly developed; concentric lines or bands of crystal-bearing wood fibers are visible under lens on moistened cross section and resemble parenchyma lines. Pores small to rather large; fairly numerous; diffuse- or inclined to ring-porous; solitary or in radial multiples, less often in radial rows or small clusters; sometimes filled with deposits of calcium or black gum. Rays fine; not visible without lens on cross and tangential sections; visible, but inconspicuous, on radial surface.

Vessel perforations simple; intervascular pits large, often elongate and with large apertures; vessel-parenchyma pits large, half-bordered. Rays homogeneous; uni- or biseriate. Wood fibers with numerous, simple pits; septate, and often containing small, rhombohedral crystals of calcium oxalate.

Triplaris Pavonii Meisn. in DC. Prod. 14: 172. 1857. *Tangarana.*

Tree, 75 feet tall. Crown irregular or conical. Trunk straight, round, slender, and unbranched up to 60 feet. Bark yellowish or dark reddish brown, fairly smooth, and thin. Flowers rose or pale pink and attractive; October–November.—Fairly common; in dry loam along margin of forest (alt. 500 ft.).

Wood pale pink with dark, irregular striping caused by stain; odorless and tasteless; straight-grained; medium-textured; light in weight, but strong; requires a sharp knife to cut smoothly across grain, easy to work, takes a smooth finish, and holds its place well. Growth rings absent or poorly defined. Pores of fairly small or medium size; not numerous, evenly scattered; solitary, in radial multiples or rows of 2–3, infrequently in tangential pairs or small clusters; open or filled with black gum or calcium deposit. Vessel lines long. Rays

numerous, fine, and visible only with lens on cross and tangential sections; reddish brown and at limit of vision on moistened radial.

Loreto: lower Huallaga, *4176b*.

Triplaris peruviana Fisch. & Mey. ex C. A. Mey. Mém. Acad. Pétersb. VI. Sci. Nat. 4: 149. 1845. *Tangarana blanca.*

Medium-sized tree, about 60 feet in height. Branches few and spreading. Trunk straight, round, up to 20 inches in diameter, and unbranched for 40 or 50 feet. Bark pale grayish brown; inner bark scarlet brown. Leaves entire, narrow-ovate, glabrous on both surfaces. Flowers small, white; May–June. Fruit 3-winged and containing 1 lustrous black seed. Common along the Nanay River (alt. 400 ft.); in humid land or in the vicinity of watercourses.

Wood pale yellowish or pinkish brown with an occasional scarlet streak; odorless and tasteless; moderately straight-grained; rather coarse-textured; light in weight, but firm; slightly fibrous, easy to cut; susceptible to insects. Growth rings present, but not well defined. Pores of medium size; not numerous, evenly distributed; solitary, in radial multiples or rows of 2–6, infrequently in diagonal or tangential pairs or in small clusters. Vessel lines prominent against the lighter background; vessels frequently filled with reddish or dark brown gum. Rays very fine; visible only with lens on all surfaces.

Loreto: upper Nanay, *1008*.

Triplaris Poeppigiana Wedd. Ann. Sci. Nat. III. 13: 265. 1849. *Tangarana.*

Tree, about 40 feet in height. Crown spreading. Trunk straight, cylindrical, slender, and undivided for 18 feet. Bark light gray, pinkish, or reddish brown, very thin, and smooth. Leaves up to 12 inches long, and 4.5–5 inches in width, glabrous above, pubescent beneath especially along costal vein. Flowers racemose; calyx scarlet-colored; April–May.—Common in the lower Nanay region (alt. 400 ft.); in sandy or dry medium loam in abandoned land or along margin of forest; reported also from La Merced (alt. 2,000 ft.).

Sapwood oatmeal-colored or pale pinkish brown; heartwood dull medium brown. Wood odorless and tasteless; straight-grained; medium-textured; light in weight, but firm and strong; fibrous, easy to cut, takes a smooth and fairly lustrous finish; susceptible to insects. Growth rings indistinct. Pores moderately small to medium-sized; not numerous, well distributed; solitary or in radial

multiples of 2–6; open. Vessel lines fairly fine and slightly darker than adjacent elements. Rays moderately fine, numerous, evenly and closely spaced on cross section; indistinct on tangential; slightly darker than background and faintly discernible to unaided eye on moistened radial surface.

Loreto: lower Nanay, *424*.

NYCTAGINACEAE. Four-o'clock Family

Small or medium-sized trees, shrubs, or mostly herbs, sometimes climbing. Leaves opposite or alternate, entire, without stipules. Flowers small or large and showy. Fruit an anthocarp, composed of the persistent base of the perianth and an indehiscent utricle, either dry or resembling a seed or fleshy and drupe-like. The timbers are not commercially important.

Woods whitish, yellowish, or brown; fine-textured; of light weight to heavy; require a sharp knife to cut smoothly across grain; mostly perishable. Parenchyma paratracheal; sparingly developed and indistinct. Pores small or medium-sized; solitary, in multiples, rows, or clusters; open or less often closed. Rays fine. The woods of this family are of interest in that they are characterized by anomalous structure, with included phloem, of the island type, sometimes forming more or less definite, concentric bands, and often just outside of each row of pores, producing a mushroom design on cross section.

Vessel-parenchyma pits very small, bordered. Rays heterogeneous; uniseriate or biseriate. Numerous, large crystal bundles of raphides, often readily visible with lens, are present in parenchyma associated with included phloem.

1. NEEA Ruiz & Pavón

Tall shrubs or small to medium-sized trees. Leaves opposite or whorled. Flowers small, greenish, arranged in cymes or small panicles, the two sexes on separate plants. Fruit an elongated drupe with scant flesh. Wood is sometimes used locally for tool handles and bowls for crushing rice.

Sapwood whitish or brownish, usually with a grayish stain; heartwood dark chocolate brown. Wood odorless and tasteless; fairly lustrous; fine- or fairly fine-textured; moderately light; requires a sharp knife to cut smoothly across grain; does not take a smooth polish; not durable. The most characteristic feature of the wood is the presence of included phloem of the island type. Parenchyma sparsely developed; paratracheal. Pores small or medium-sized; fairly numerous or numerous; mostly in small radial multiples, less

frequently in radial rows or small clusters, seldom solitary; those in association with the phloem producing a mushroom design. Rays fine or very fine on cross section; not visible without lens on other surfaces. Large crystal bundles of raphides usually present in abundance.

Neea divaricata Poepp. & Endl. Nov. Gen. & Sp. 2: 45. 1838. *Cumala, Shula.*

Small tree, 18 to 25, seldom up to 40, feet in height. Crown round or spreading. Trunk usually bent, cylindrical, slender, and free of branches for from 2 to 12 feet. Bark light or dark brown, fairly smooth or with small lenticels, and scaly. Fruit ovoid, bluish black when mature; June–July.—Fairly common and widely distributed; in dense forest, often in humid loam or in the vicinity of streams (alt. 380–1,800 ft.). Timber is used for tool handles, house construction, and utensils for pounding rice.

Wood variable in color from creamy yellow to dark grayish brown, often with pinkish red or dark brown streaks; straight-grained; light or rather heavy, firm, and strong. Growth rings absent or indistinct. Pores small; few; solitary or in radial multiples or rows of 2–3. Vessel lines very fine and indistinct. Rays fine; invisible without lens on all surfaces.

Loreto: La Victoria, *2527, 2948;* Recreo, lower Huallaga, *3998.* —San Martín: Rumisapa, near Tarapoto, *6830;* Juan Guerra, *6906.*

Neea floribunda Poepp. & Endl. Nov. Gen. & Sp. 2: 46. 1838. *Mullo-caspi.*

Small tree, 15 to 35 feet in height. Crown spreading. Trunk straight, moderately round, about 13 inches in diameter, branching 2 or 3 feet above the base, and with small buttresses. Bark very thin, light gray to purplish brown, fairly smooth or with small lenticels. Fruit round, pale pink or red; September–October.—Fairly common in the lowland (alt. 450 ft.); in medio-open dry loam or along margin of forest. Wood is not used locally.

Wood yellowish or pale brown with extensive dark gray or grayish brown areas; has a fetid odor when fresh; straight-grained; light in weight and rather soft.

Loreto: lower Huallaga, *4535, 4708, 5023.*

Neea laxa Poepp. & Endl. Nov. Gen. & Sp. 2: 45. *pl. 162.* 1838.

Common shrub or small tree, 3 to 20 feet tall. Flowers yellowish. Fruit ovoid, dark violet; November.—Forming undergrowth in dense forest (alt. 380–1,600 ft.).

Loreto: lower Nanay, *583;* Caballo-cocha, *2025;* lower Huallaga, *4554, 4691, 5089, 5370.*—San Martín: Tarapoto, *5876, 6108.*

Neea parviflora Poepp. & Endl. Nov. Gen. & Sp. 2: 46. 1838. *Yana-muco.*

Tall shrub, up to 15 feet tall. Bark thin, pinkish or dark brown, and fairly smooth. Flower-bearing branchlets reddish, pendent. Fruit purplish brown, turning black at maturity; October–November.—Forming undergrowth in dense forest (alt. 450 ft.). The leaves are masticated by the Indians for whitening and preserving their teeth.

Wood pale brown with occasional darker brown bands. Raphides very common in the strands of included phloem.

Loreto: lower Huallaga, *4108.*

Neea Spruceana Heimerl, Notizbl. Bot. Gart. Berlin 6: 131. 1914. *Topamaka blanca.*

Small or medium-sized tree, seldom exceeding 40 feet in height. Crown open. Trunk straight, cylindrical, slender, free of branches for 1 to 6 feet, not buttressed. Bark pinkish brown, yellowish or grayish brown, with small scales. Flowers greenish, with a pale pinkish tinge: January–March.—Fairly common; in dry loam among shrubs and low trees (alt. 400–1,600 ft.).

Wood almost white with pale brown striping of bast strands, turning to yellowish or dark grayish brown on exposure; of light or medium weight; soft, but tenacious and strong; straight-grained; holds its place well when finished; fairly durable. Growth rings absent or poorly defined. Rays visible only with lens, lighter-colored than background, and irregularly spaced on cross section.

Loreto: lower Nanay, *623.*—San Martín: Tarapoto, *5885.*

Neea subpubescens Heimerl, Jahresb. Staats-Oberrealsch. Fünfhaus, Wien 23: (Reprint 36). 1897. *Intuto-caspi.*

Tree, from 20 to 45 feet in height. Crown spreading. Trunk straight, cylindrical, 5 to 10 inches in diameter, and unbranched up to three-fifths the entire height. Bark purplish brown, fairly smooth or scaly.—Common on the plain of Tarapoto in second growth (alt. 1,500 ft.).

Wood whitish throughout when fresh, turning to oatmeal-colored or yellowish brown after long exposure; of medium weight to rather heavy, brittle or fairly tough; straight-grained; finer-textured than *N. Spruceana;* somewhat fibrous, capable of taking a moderately

smooth finish; liable to stain in drying. Pores small; in small radial multiples or rows or in small clusters.

San Martín: Tarapoto, *6267, 6802, 6815.*

The following numbers of the genus *Neea* have been determined provisionally on the basis of wood specimens:

Loreto: lower Huallaga, *3857, 3874, 5086.*

2. TORRUBIA Vell.

Torrubia myrtiflora Standl. Field Mus. Bot. 8: 307. 1931. *Clavo-caspi.*

Tall tree, up to 60 feet or more in height, with narrow crown and few branches. Trunk straight, cylindrical, 9 to 12 inches in diameter, and unbranched for 40 or 45 feet. Bark papyraceous, pale gray or reddish brown, and smooth. Flowers small, white; June–July.—Rare; in open dry loam in old clearings or along margin of forest (alt. 400 ft.).

Wood pale or dark grayish brown, occasionally with a yellowish tinge; has no distinctive odor or taste; straight-grained; fairly fine-textured; light in weight; does not take a smooth finish; perishable. Growth rings absent. Parenchyma indistinct. Pores small; solitary, in radial multiples or rows, or in small clusters. Bast strands compose about two-thirds of the surface area. Vessel lines indistinct. Rays indistinct on all surfaces. Pith dark chocolate brown.

Loreto: Puerto Arturo, lower Huallaga, *5162.*

MENISPERMACEAE. Moonseed Family

1. ABUTA Aubl.

Abuta concolor Poepp. & Endl. Nov. Gen. & Sp. 2: 64. *pl. 188.* 1838. *Caimitillo, Sanango.*

Tree, from 15 to 28 feet in height. Crown spreading. Trunk straight or fairly so, round, 5 inches in diameter, unbranched up to half the entire height, and sometimes with fairly large surface roots. Bark variable in color from pale grayish white to dark green or almost black, rough; bark of roots is reputed to be used for medicinal purposes. Leaves alternate, stalked, and without stipules. Flowers small, greenish, dioecious. Drupe ovoid, yellow when mature; August to beginning of October.—Fairly common in the lowland; in dry loam in old clearings or along margin of forest (alt. 400 ft.).

Wood pale yellowish or light chocolate brown; odorless, but has a very bitter taste; roey- or irregular-grained; coarse-textured; very heavy and not easy to work; takes a smooth finish; durable and is immune to stain and insects. Growth rings present. Parenchyma paratracheal and indistinct, also in very fine, uniformly spaced, tangential or concentric lines. Pores of small or medium size; not numerous, diffuse; solitary; mostly open. Vessel lines indistinct. Rays fine, of light color, interrupted by parenchyma lines, and forming a characteristic arrangement on cross section; darker than adjacent elements and distinct on tangential and radial surfaces. Wood is distinctive because of its anomalous structure. The cross section shows a characteristic pattern, the radially disposed, wedge-shaped bundles of xylem and phloem being surrounded by prominent bands of conjunctive tissue in concentric laminations connected by the rays.

Vessel perforations exclusively simple; intervascular pits of medium size, alternate, rather numerous, but not crowded, with apertures slit-like and barely included. Rays heterogeneous and showing a tendency to homogeneous; multiseriate, very high. Wood fibers with indistinctly bordered pits.

Loreto: Caballo-cocha, *2435;* San Antonio, upper Itaya, *3500;* Yurimaguas, *4713;* Punchana, near Iquitos, *8013*.

ANONACEAE. Custard Apple Family

A large group of trees, shrubs, or climbers, widely distributed in the tropics and subtropics. Leaves alternate, entire, without stipules. Flowers solitary or clustered, usually perfect; stamens numerous. Fruit consists of 1 or more carpels, these sessile or stalked, usually fleshy, free or united to form a many-celled fruit. The members of this family are often aromatic.

Woods range from pale yellow or light brown to greenish, dark brown, or nearly black; rather fine-textured; light and soft to very heavy and hard. Growth rings usually present and more or less distinct; delimited by variation in the thickness of the fiber walls and supplemented by regular parenchyma lines. Pores are well distributed throughout the wood, except for the ring-porous *Asimina;* solitary or in multiples of 2–4, rarely up to 8. Parenchyma abundantly developed; in fine but definite metatracheal lines or bands that are numerous, closely and uniformly spaced, and interrupted by, and forming a spiderweb pattern with, the rays; paratracheal

parenchyma also present in many species. Rays usually distinct on all surfaces.

Vessel perforations exclusively simple; intervascular pit-pairs extremely small, very numerous, more or less crowded, or alternate, with slit-like to broadly lenticular apertures; vessel-ray pits distinctly bordered and similar to the intervascular, small or of medium size. Rays variable from homogeneous to distinctly heterogeneous; from 1–14, mostly 5–10, cells wide. Sac-like oil cells often in association with rays. Wood fibers with small to minute and indistinctly bordered pits.

1. ANAXAGOREA A. St. Hil.

Tall shrubs or small to medium-sized trees, widely distributed in the lowland. Their woods are uniform pale brown; have no distinctive odor or taste; are straight-grained; fine- or medium-textured; light in weight, of firm to medium density, and tenacious; usually durable and easy to work. Parenchyma in fine, closely spaced tangential lines extending between the rays. Pores at limit of vision; fairly numerous or numerous, uniformly distributed; solitary or less often in radially disposed multiples. Vessel lines fine. Rays broad on cross section; distinct on tangential and usually on radial; homogeneous; 4 or more cells wide.

Anaxagorea minor Diels, ex R. E. Fries, Acta Hort. Berg. 12: 22. *fig. 2.* 1934.

Small, forest tree, from 17 to 20 feet high. Crown spreading. Trunk slender and clear of limbs for 10 feet. Bark pale green or chocolate brown and fissured. Flowers yellow; April–May.—In old clearings or along margin of forest (alt. 450 ft.).

Wood pale brown with a grayish hue; straight- or slightly wavy-grained; medium-textured; of fairly light or medium weight; easy to cut and takes a smooth finish. Parenchyma visible with lens as numerous, fine, closely and evenly spaced, tangential lines extending between the rays. Pores small; not numerous; solitary; often surrounded by dark brown gum stains. Rays distinct or conspicuous on all surfaces.

Loreto: middle Nanay, *849, 854, 855.*

Anaxagorea pachypetala (Diels) R. E. Fries, Acta Hort. Berg. 12: 10. 1934. *Espintana.*

Small or medium-sized, slender tree, at times attaining a height of 50 feet. Crown spreading. Trunk erect, not buttressed. Bark

moderately thick, dark gray.—Common in some localities; in fairly dense forest (alt. 400 ft.). Timber is employed locally for house construction and fuel.

Wood uniform light brown throughout; straight-grained; medium-textured; moderately hard and heavy; easy to work and takes a smooth, fairly lustrous polish. Growth rings present. Pores fairly numerous; solitary or in radial multiples of 2–3, seldom 4; open.

Loreto: lower Itaya, *19*.

Anaxagorea pallida Diels, Notizbl. Bot. Gart. Berlin 11: 79. 1931. *Espintana.*

Small, slender, forest tree or tall shrub, approximately 15 feet in height. Crown spreading. Trunk straight, round, and free of branches for 8 feet. Bark pale purplish brown; inner bark coarsely fibrous. Leaves papyraceous, glabrous, oblong, long-acuminate at tip, short-angustate at base, and costa prominent on the under surface. Fruiting in October–November.

Wood uniform pale brown; straight-grained; medium-textured; light in weight and firm; easy to work.

Loreto: Santa Rosa, lower Huallaga, *4873*.

2. ANONA L.

Small trees or shrubs with persistent or deciduous leaves, confined almost exclusively to tropical and subtropical America, although the range of many species has been extended through cultivation. Flowers usually solitary and lateral on the branches. Fruit composed of numerous, fleshy carpels united at maturity to form a many-celled fruit. The bark of some species yields a fiber suitable for cordage, but the principal value of the trees lies in their edible fruits, some of which are large and succulent. The timber is not durable and is rarely used except for fuel.

Wood varies from light and soft to medium weight and firm; medium- to coarse-textured; often fibrous or splintery; not durable. Pores of medium size; fairly numerous to numerous, solitary or less often in small multiples; mostly open. Rays broad on cross section; distinct or fairly distinct on tangential and radial surfaces; 4–6 cells or more wide and up to 24 cells high.

Anona montana Macfad. Fl. Jamaica 1: 7. 1837. *Chirimoya, Guanábana, Huanábana.*

Small tree, from 15 to 28 feet in height. Crown spreading or round. Trunk erect, columnar, slender, and branching from the base

or clear of limbs up to 10 feet. Leaves oblong-elliptical, short-acuminate. Flowers with olive green petals. Fruit about 2 inches in diameter, round, with small, fleshy, straight spinules, and an edible, succulent pulp; seeds brown.—In second growth and often cultivated (alt. 400–1,500 ft.).

Wood pale brown, turning to dark grayish brown on exposure, and with dark or almost black areas; has no distinctive odor or taste; light in weight and moderately soft.

Loreto: Iquitos, *3687;* lower Huallaga, *3818, 4450.*—San Martín: Tarapoto, *5545.*

Anona muricata L. Sp. Pl. 536. 1753. *Chirimoya, Guanábana, Huanábana.*

Small, glabrous, evergreen tree, 20, sometimes up to 30, feet in height. Crown open. Trunk branching from base, slender. Bark grayish or pinkish brown, with shallow longitudinal ridges. Leaves obovate, ovate or elliptic, lustrous, and have a rather offensive odor. Flowers yellow; July–August. Fruit ovoid, with numerous recurved, fleshy spines; the succulent flesh is eaten fresh, made into preserves, or the juice is used for preparing a refreshing beverage.—Often cultivated.

Sapwood pale pinkish brown; heartwood dark grayish. Wood light in weight and moderately soft; fairly fine- or medium-textured; easy to work and takes a lustrous finish.

Loreto: Caballo-cocha, *2399.*

Anona scandens Diels, var. **polychyla** Diels, Notizbl. Bot. Gart. Berlin 11: 86. 1931. *Chirimoya, Huasca-anona.*

Shrub, from 5 to 7 feet tall. Bark moderately thick, grayish brown with rather coarse scales. Branches densely tomentose. Flowering in October–November.—In thickets (alt. 500–700 ft.).

Sapwood pale brown with darker markings of rays; heartwood thin and slightly darker than the sap. Wood of medium weight, rather tenacious, and strong; straight- or roey-grained; medium- or coarse-textured; easy to work and takes a smooth finish.

Loreto: lower Huallaga, *4757.*

Anona Tessmannii Diels, Notizbl. Bot. Gart. Berlin 9: 140. 1924. *Sacha-anona.*

Small, often straggly, tree, at times attaining a height of 32 feet. Crown dense and spreading. Trunk slender, branching from near the base or clear of limbs up to three-fourths the height. Bark dark

brown, with shallow, vertical ridges. Leaves leathery, glabrous above, ovate-elliptic, short-obtuse or acuminate at apex, and acute or subrounded at base. Flowering in June–July.—Abundant throughout the lowland (alt. 380–500 ft.); in thickets, usually near streams.

Sapwood grayish or pale brown; heartwood thin, dark brown. Wood has no distinctive odor or taste; straight-grained; medium- to coarse-textured; fairly light in weight and soft; easy to cut and capable of taking a lustrous finish. Growth rings present owing to variation in depth of color. Parenchyma indistinct or barely visible with lens. Pores numerous, uniformly distributed; solitary or in radial multiples of 2–4, seldom more; open. Vessel lines prominent owing to their color, which is darker than adjacent elements. Rays distinct or conspicuous on all surfaces.

Loreto: Pebas, *1842;* Caballo-cocha, *2418;* La Victoria, *2853*, *3048*.

3. CREMASTOSPERMA R. E. Fries

Cremastosperma gracilipes R. E. Fries, Acta Hort. Berg. 10: 325. *pl. 26*. 1931.

Shrub, from 6 to 15 feet tall. Branchlets glabrous. Leaf blades papyraceous, oblong or oblanceolate-oblong, acuminate at tip, rounded or obtuse at base. Flowers axillary, solitary; October–November.—Common; forming understory in dense forest and sometimes in open patches; reported also at Puerto Melendez, below the Pongo de Manserriche, middle Marañón.

Loreto: Puerto Arturo, lower Huallaga, *5296*—herbarium material only.

4. CYMBOPETALUM Benth.

Shrubs or small, slender trees. Leaves membranaceous or papyraceous. Wood light-colored, ranging from pale grayish brown to pale yellow, sometimes with a faint greenish tinge; fine- or fairly fine-textured; of medium weight to heavy; capable of taking a smooth polish; liable to check in drying, but appears to be durable. Parenchyma visible only with lens. Pores few to fairly numerous, uniformly distributed; solitary or in small radial multiples. Rays faintly visible without lens on cross and tangential sections; usually prominent on radial.

Cymbopetalum longipes Diels, Verh. Bot. Ver. Brandenb. 47: 132. 1905.

Slender shrub, 5 to 15 feet tall, sometimes scandent. Pilger, however, describes the species as a small tree, 10 to 30 feet high.

Bark pale brown with short horizontal fissures. Leaf blades short-petiolate, ovate-elliptic, cuspidate, papyraceous, glabrous above. Flowers greenish. Fruit light green, borne in clusters; October–November.

Wood almost white or pale yellowish to greenish brown; straight-grained; moderately fine-textured; fairly heavy, tough, and hard; capable of taking a moderately lustrous polish; appears to be durable. Pores more numerous and larger and rays slightly more pronounced on cross section than in *C. Tessmannii*.

San Martín: Tarapoto, *6512;* Juan Guerra, *6875, 6876.*—Loreto: Yurimaguas, *7831.*

Cymbopetalum Tessmannii R. E. Fries, Acta Hort. Berg. 10: 188. *pl. 7.* 1931. *Espintana.*

Tree, 30 feet high. Crown spreading. Trunk straight, round, slender, and free of limbs for 18 feet. Bark light brown, moderately smooth or rough. Leaves membranaceous, oblong-elliptic, lanceolate or oblanceolate, long-acuminate at apex, acute, rounded, or obtuse at base.—In flood-free forest (alt. 500 ft.).

Sapwood not sharply defined, white or pale yellowish; heartwood grayish or yellowish and darkening on exposure. Wood has no distinctive odor or taste; straight-grained; fine- and uniform-textured; hard, heavy, and tough; takes a fairly smooth polish; durable. Growth rings present. Parenchyma visible with lens as numerous, evenly spaced lines extending between the rays. Pores barely distinguishable with lens or small; few, evenly scattered; solitary or in small multiples; open or closed. Vessel lines indistinct or faintly visible. Rays at limit of vision on moistened cross and tangential sections; darker than the ground mass and prominent on radial surface.

Loreto: San Antonio, upper Itaya, *3513.*

5. DICLINANONA Diels

Diclinanona calycina (Diels) R. E. Fries, Acta Hort. Berg. 12: 4. 1934.

Tree of the lowland, often attaining a height of 110 feet or more. Crown flat. Trunk cylindrical, erect, 15 to 25 inches or more in diameter, and clear of limbs up to 42 feet. Bark moderately thick, light brown, sculptured; inner bark brown and slightly fibrous.—Rare; in dense, flood-free forest (alt. 360 ft.). Timber is used to a small extent for the construction of huts.

Sapwood grayish brown and variegated on account of the prominent rays; heartwood dark brown, thin. Wood when freshly cut has a sweet odor suggesting honey, not perceptible in dried material; straight- or roey-grained; medium- or fairly coarse-textured; heavy, hard, and fairly compact, but rather splintery; easy to work, takes a smooth and highly lustrous polish; liable to check in drying; probably durable. Growth rings indistinct or faintly visible owing to slight variation in abundance of elements. Parenchyma in numerous, very fine, closely and evenly spaced lines or bands extending between the rays. Pores of medium size or moderately large; fairly numerous, uniformly distributed; solitary or in radial multiples of 2–4, seldom in small clusters; open or less often filled with tyloses or dark gum. Rays fairly broad on cross section; moderately distinct on tangential; conspicuous on radial.

Loreto: La Victoria, *2756*.

6. DUGUETIA A. St. Hil.

Tall shrubs or small trees. Wood yellowish or pale to fairly dark brown; has a slightly fragrant or fetid odor when fresh; light and soft to rather heavy and hard; fine-textured; easy to work; usually durable. Parenchyma lines closely spaced and usually wavy. Pores small; fairly numerous, diffuse; solitary or infrequently in multiples; mostly open. Rays broad on cross section; indistinct or fairly distinct on tangential and radial; 3–5 cells wide and low.

Duguetia quitarensis Benth. in Hook. Lond. Journ. Bot. 2: 361. 1843. *Aberemoa quitarensis* (Benth.) Fries, Svensk. Vet. Akad. Handl. 34, no. 5: 20. 1900. *Tortuga caspi*.

Small or medium-sized, forest tree. Crown spreading. Trunk straight, cylindrical, 6 to 12 inches in diameter, and unbranched for approximately one-fifth the height. Flowers yellow; November–December. Fruit globular, spiny.—Uncommon. Timber is used to a limited extent for pillars and house construction.

Sapwood not distinctly demarcated, pale brown; heartwood slightly darker brown, thin. Wood straight-grained; fine-textured; fairly heavy and hard; takes a smooth polish with a moderately high luster and holds its place well when finished; durable. Growth rings absent or poorly defined. Parenchyma abundantly developed. Pores fairly numerous, uniformly distributed; solitary or infrequently in radially or tangentially disposed multiples of 2–3. Vessel lines short, fine, and slightly darker than the background. Rays at limit

of vision and lighter in color than the surrounding elements on cross section.

Loreto: Santa Rosa, lower Huallaga, *4907*.

Duguetia Spixiana Mart. Fl. Bras. 13, pt. 1: 23. 1841. *Aberemoa Spixiana* (Mart.) Fries, Svensk. Vet. Akad. Handl. 34, no. 5: 22. 1900. *Anona, Espintana blanca.*

Small, forest tree, seldom exceeding 26 feet in height. Crown spreading. Trunk slender, straight, moderately round, and clear of limbs for one-third the height. Leaves smooth above, pilose beneath. Fruit spiny; October–November.—Common along banks of streams (alt. 450–500 ft.); previously reported from near the Rio Negro, State of Amazonas, Brazil.

Sapwood indistinctly defined, pale or medium brown; heartwood yellowish brown. Wood has a characteristic fetid odor when freshly cut; light and rather soft; liable to be damaged by insects.

Loreto: upper Itaya, *3292, 3455;* Fortaleza, lower Huallaga, *4348*.

7. GUATTERIA Ruiz & Pavón

Shrubs or trees. Flowers solitary or clustered, in the leaf axils or on naked branches. Fruit a cluster of 1-seeded, stalked berries.

Wood varies in color from pale brown to reddish or dark brown; often has a spicy odor; medium- to rather coarse-textured; light in weight to heavy; usually lustrous; sometimes durable. Pores fairly numerous; mostly solitary; open. Rays distinct on cross and tangential sections; usually conspicuous on radial; up to 9 cells wide and high.

Guatteria hyposericea Diels, Notizbl. Bot. Gart. Berlin 11: 76. 1931. *Yana-huasca.*

Tree, from 30 to 36 feet in height. Crown spreading; branches drooping. Trunk straight or moderately straight, round or compressed, 7 inches or more in diameter, and unbranched for about 18 feet. Bark very dark brown or almost black; inner bark finely fibrous. Flowers yellowish brown; December–January. Fruit ovoid, green.—Fairly common on the plain of Tarapoto (alt. 1,400 ft.); in sandy or dry medium loam along sides of paths or among shrubs and low trees of second growth.

Sapwood pale yellowish brown with grayish cast; heartwood dull medium brown, thin. Wood has no distinctive odor or taste; straight- or fairly straight-grained; medium- to rather coarse-textured; of fairly light or medium weight, firm, brittle; easy to work, takes

a smooth polish with a high luster which disappears after long exposure, and holds its place well when finished; durable. Parenchyma in numerous, fine, slightly wavy bands extending tangentially between the rays. Pores at limit of vision; fairly numerous, well distributed; solitary or less frequently in radial, seldom tangential, multiples of up to 6. Vessel lines appear as fairly coarse scratches of darker color than background. Rays of lavender brown color and conspicuous on radial surface.

San Martín: Tarapoto, *6323*, *6671*.

Guatteria microcarpa Ruiz & Pavón, Fl. Peruv. 5. *pl. 479.* 1802. *Tortuga-caspi.*

Small tree, 22 feet tall, although said to attain greater height. Crown open. Trunk slender. Bark dark brown, with fairly coarse, purplish or lighter brown fissures and small, dark lenticels; inner bark pale chocolate-colored and slightly fibrous. Flowers pale yellow, pendent from the main branches; April–May.—Uncommon; in heavy loam in dense, tall forest (alt. 400 ft.).

Sapwood well defined, pale pinkish brown; heartwood reddish brown. Wood at times has a slightly bitter taste; straight- or interwoven-grained; medium-textured; of medium weight; easy to work. Growth rings present, but not distinct. Parenchyma lines not as distinct with lens as in *G. hyposericea*. Pores of small or medium size; not numerous; solitary or in radial multiples of 2–3. Vessel lines fairly fine. Small dark brown globules of gum common in ray cells and especially common on tangential surface.

Loreto: lower Nanay, *573*.

Guatteria phanerocampta Diels, Notizbl. Bot. Gart. Berlin 11: 76. 1931. *Cara-huasca.*

Tree, 40 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched for 6 feet. Bark dark brown or almost black; inner bark separates into long, narrow flakes. Flowers pale yellow; July–August. Fruit round, yellow when mature. —Not abundant; adjacent to streams and in areas subject to inundations during the rainy season (alt. 450 ft.).

Sapwood lustrous pale brown, streaked; heartwood pale to very dark brown or almost black, thin. Wood has a faint spicy odor; moderately straight- or wavy-grained; medium-textured; light in weight, but firm; easy to cut, takes a smooth finish; does not appear to be durable. Pores of fairly small or medium size; not numerous;

solitary or less frequently in radial, seldom in tangential, multiples of 2–3. Small dark brown specks of gum frequently present in ray cells and readily discernible with lens on tangential and radial sections.

Loreto: San Antonio, upper Itaya, *3436*.

8. MALMEA R. E. Fries

Tall, forest trees. Wood yellowish or pale brown; medium- to coarse-textured; of light or medium weight; inclined to be fibrous and fairly lustrous. Pores of medium size to large; fairly numerous; solitary or in multiples, seldom in clusters; mostly open. Rays broad on cross section and distinct on radial. Timber is used to a small extent for the construction of huts and houses, but mostly for fuel.

Malmea cuspidata Diels, Notizbl. Bot. Gart. Berlin 11: 78. 1931. *Espintana.*

Tall, forest tree, attaining a height of up to 110 feet. Crown spreading. Trunk straight, round, 14 to 24 inches in diameter, and undivided for about a third of the entire height. Bark about 0.25 inch thick, dark grayish brown or almost black, fairly smooth; inner bark finely fibrous. Leaves coriaceous, obovate-elliptic, cuspidate. Flowers short-stalked and with fleshy petals. Fruit subround, 1-seeded; June.—Uncommon; in fairly dense growth subject to inundations (alt. 400 ft.).

Sapwood pale yellowish brown with a grayish tinge; heartwood pale brown and occasionally with dark streaks, not sharply defined. Wood has no distinctive odor or taste; of light or medium weight; easy to work and takes a smooth, fairly lustrous finish; straight-grained; medium-textured. Growth rings present owing to some variation in depth of color. Parenchyma lines very fine, either extending from ray to ray or at times inclined to be continuous and concentric. Pores barely discernible without lens; not numerous, well distributed; solitary, less frequently in radial multiples of 2–4, seldom tangentially disposed. Vessel lines fine, short; black gum and translucent deposits frequently present. Rays widely spaced on cross section.

Loreto: lower Itaya, *113*.

Malmea sp. *Cara-huasca.* Tree, 90 feet tall. Crown spreading. Trunk erect, cylindrical, 16 to 22 inches in diameter, and undivided for 60 feet. Bark 0.25 inch thick, pale gray to dark purplish, fairly

smooth; inner bark fibrous. Fruit ovoid, small, and borne in clusters; November.—Not common; in dense forest subject to periodical inundations (alt. 500 ft.).

Wood pale brown throughout; straight-grained; fairly coarse-textured; of light weight, firm; easy to cut and capable of taking a smooth finish; not durable. Pores are larger, vessel lines more pronounced, and parenchyma lines more regular and distinct than in *M. cuspidata.*

Loreto: Sapote-yaco, lower Huallaga, *4896.*

9. ROLLINIA A. St. Hil.

Small, slender trees or shrubs, sometimes cultivated. Flowers with connate petals, forming a 3–6-lobed tube, the outer ones with broad wings.

The Peruvian species range in height from 15 to 25 feet. Crown round or spreading. Trunk straight or moderately straight, round or slightly compressed, 6 inches or more in diameter, and unbranched for from 2 to 9 feet. Bark dark purplish to almost black; inner bark slightly fibrous. Fruit large, ovoid, with soft, fleshy spines; July–August.—In dry or slightly humid loam in open patches or along margin of forest growth (alt. 350–400 ft.).

Wood yellowish or pinkish, often with purplish streaks; light and soft or of medium weight; medium-textured; requires a sharp knife to cut smoothly across grain. Parenchyma in indistinct bands. Pores of medium size; fairly numerous, uniformly scattered; solitary or less frequently in multiples; usually open. Rays broad on cross section; occasionally visible on tangential and radial surfaces; 3–5 cells wide and low.

Loreto: Pebas, *1965;* Caballo-cocha, *2407;* La Victoria, *2940.*

10. UNONOPSIS R. E. Fries

Tall shrubs or small trees, often with fibrous inner bark which is used locally for cordage. Flowers with numerous, densely crowded stamens.

Wood varies from oatmeal-colored or yellowish to pale or dark brown; sometimes slightly fragrant; fine- or medium-textured; of medium weight; inclined to be fibrous and splintery; not durable. Parenchyma in indistinct bands. Pores of medium size; few or fairly numerous, diffuse; solitary or in multiples; mostly open. Rays prominent on all surfaces; 6–8 cells wide and mostly high.

Unonopsis floribunda Diels(?), Notizbl. Bot. Gart. Berlin 9: 137. 1924. *Icoja, Icoje.*

Small tree, seldom exceeding 35 feet in height. Crown spreading. Trunk bent and approximately 7 inches in diameter. Bark up to 0.5 inch thick, dark brown, fairly smooth or scaly; inner bark dark reddish brown and coarsely fibrous. Leaves chartaceous and glabrous. Flowers minutely pubescent; October.—Not common; in slightly humid loam along banks of streams (alt. 500 ft.); reported also by Tessmann at Cashibo Playa, middle Ucayali.

Wood oatmeal-colored throughout; odorless or faintly fragrant and slightly bitter; roey-grained; medium- or rather coarse-textured; of light or medium weight, brittle, and fibrous; easy to work; does not appear to be durable. Growth rings present owing to some variation in depth of color. Pores not numerous; solitary, in radial multiples of 2–3, or in small clusters. Rays widely spaced and pale yellow on cross section.

Loreto: upper Nanay, *1204.*

Unonopsis spp. *Cara-caspi, Yana-varas.* Forest tree, 30 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched up to half the entire height. Bark greenish yellow, fairly smooth or with few long, shallow, vertical fissures; inner bark purplish brown, fibrous, and useful for cordage. Flowers small, white; April–May. Fruit ellipsoid, brown when mature.—In fairly dense, flood-free forest (alt. 450 ft.).

Wood pale yellowish brown with darker brown markings of rays; has an agreeable odor and a slightly bitter taste when freshly cut; straight- or wavy-grained; medium- to coarse-textured; of fairly light or medium weight, firm, and strong; slightly fibrous, takes a smooth polish with a moderate luster, and holds its place well when finished. Growth rings present, but inconspicuous. Parenchyma lines very fine, numerous, evenly spaced, wavy, and extending from ray to ray. Pores fairly small; well distributed; solitary or in small radial or tangential multiples; open. Vessel lines short and fine; vessel segments visible with lens and grayish deposits frequently present. Rays conspicuous, especially on radial surface.

Loreto: upper Nanay, *841, 1184;* Caballo-cocha, *2320.*

11. XYLOPIA L.

Shrubs or small, sometimes straggly, trees, common in thickets and forest growth. Leaves leathery or chartaceous. Fruit usually a cluster of red berries, these splitting open when ripe.

Wood pale yellow, grayish, or medium to reddish brown; fine- or medium-textured; light and soft to heavy and hard; easy to work; mostly durable. Pores fairly numerous; solitary or in multiples, seldom in clusters; usually open. Rays broad on cross section; occasionally distinguishable without lens on tangential and radial surfaces; from 2–5 cells wide.

Xylopia aromatica (Lam.) Mart. Fl. Bras. 13, pt. 1: 43. 1841; R. E. Fries, Acta Hort. Berg. 10: 106. 1930. *Matáro, Omechuai-caspi.*

Tree, 35 feet in height. Crown dense, spreading. Trunk straight, cylindrical, slender, and unbranched for 12 feet. Bark light gray or dark reddish brown, scaly or with long, rather coarse fissures and fairly small lenticels; inner bark separates into long flakes. Leaves oblong, acute or short-cuspidate at apex, and glabrous. Fruit reddish brown and borne only at the summit; December–January.—Not common; in sandy loam among shrubs and low trees of second growth (alt. 1,400 ft.). Timber is used for general carpentry.

Sapwood usually well defined, varying in color from yellowish or grayish to pale pinkish brown; heartwood pale or reddish brown. Wood has no distinctive odor or taste; of fairly light to medium weight, firm; straight- or wavy-grained; medium-textured; inclined to be fibrous, takes a smooth finish; checks in drying; not very durable. Growth rings absent or poorly defined. Parenchyma in numerous, evenly spaced, tangential bands. Pores at limit of vision; few or fairly numerous; solitary or in radial multiples of 2–4. Vessel lines indistinct to readily visible owing to dark brown gum present. Rays fairly numerous and of lighter color than the surrounding elements on cross section; distinct against the lighter background on radial. Pith pale grayish brown; globules of dark brown gum abundant.

San Martín: Tarapoto, *5378, 5850.*

Xylopia peruviana R. E. Fries, Acta Hort. Berg. 10: 117. *fig. 10.* 1930. *Pichi-varilla.*

Straggly tree or shrub, 12 to 15 feet high. Crown dense, spreading. Trunk branching from base. Bark reddish or purplish, fairly smooth or with small scales. Leaves chartaceous, elliptic, up to 5 inches long and 2 inches broad. Flowers solitary, axillary; January–February.—Uncommon; forming understory in dense, flood-free forest (alt. 1,600 ft.).

Sapwood pale yellow with grayish streaks and turning to pale yellowish brown on exposure; heartwood medium grayish brown. Wood has no distinctive odor, but is slightly astringent to taste; heavy, hard, and compact; takes a smooth, but rather dull finish; straight- or fairly straight-grained; fine-textured; probably durable. Growth rings present. Parenchyma lines numerous, fine, evenly spaced, wavy, and lighter in color than background. Pores minute or small. Vessels often filled with specks of brown gum. Rays sinuous and at limit of vision on cross and radial sections; indistinct without lens on tangential.

San Martín: Mayo River, middle Huallaga, *6225*.

MYRISTICACEAE. Nutmeg Family

Trees, or rarely shrubs, widely distributed in the American, African, and Asiatic tropics. Leaves alternate, entire, stalked, and without stipules. Flowers small, of 2 sexes on separate plants, often umbellate or panicled, regular. Fruit nutmeg-like, resinous, fleshy, opening by valves, and the single seed is covered by an aril, which, in the case of nutmeg, is the mace of commerce.

Sapwood pale brown in color, often with a pronounced grayish or pinkish cast; heartwood in some species not sharply defined, in others dark red to chocolate brown; not highly lustrous. The woods of this family are light and soft to moderately heavy and hard. Growth rings at times absent; when present indicated either by concentric lines of wood parenchyma or, less often, by rows of flattened wood fibers. Pores vary from very small to fairly large; few and uniformly scattered; chiefly solitary or in radial pairs, occasionally in multiples of 3–5.

Vessel perforation plates variable from predominantly simple to exclusively scalariform; intervascular pit-pairs rather small to fairly large, numerous, somewhat crowded; vessel-ray pits of two principal types: (*a*) large and radially elongated, often extending almost the width of cross-field in scalariform arrangement; and (*b*) relatively small and similar to intervascular type. Wood fibers septate and with small, simple or inconspicuously bordered pits. Wood parenchyma usually abundantly developed, of three types: (*a*) metatracheal, infrequently terminal; (*b*) paratracheal; and (*c*) diffuse. Rays most frequently heterogeneous; predominantly uniseriate and biseriate, occasionally triseriate, or seldom 3–6 cells wide. Tanniniferous tubes, present in both uniseriate and wider

portions of the rays, provide a diagnostic feature of the Myristicaceae, setting apart the nutmegs from all other woods.

1. COMPSONEURA Warb.

Compsoneura capitellata (Poepp.) Warb. Nova Acta Acad. Caes. Leop. Nat. Cur. 68: 146. 1897. *Huarmi-huarmi.*

Tree, 25 or 30 feet tall. Crown conical. Trunk slender, straight, round, and free of branches for 6 feet. Bark grayish brown. Leaves entire, alternate. Flowers very small. Fruit ellipsoid.—Abundant; in flood-free forest (alt. 500 ft.).

Wood pale yellowish or light to dark reddish brown, streaked; odorless and tasteless; straight-grained; medium-textured; of light to medium weight, firm; requires a sharp knife to cut smoothly across grain; liable to check in drying; not durable. Growth rings indicated by terminal parenchyma, the last widely and unevenly spaced. Pores of medium size; few, well distributed; mostly in small radial multiples or rows, occasionally solitary; open. Vessel lines readily visible, owing to dark brown gum and white calcium deposits present. Rays broad and at limit of vision on cross section; faintly distinguishable on tangential; indistinct to distinct on radial surface; uniseriate or biseriate in part.

Loreto: lower Huallaga, *4202.*

2. IRYANTHERA Warb.

Small to tall trees. Leaves often leathery, entire, alternate. Flowers in small fascicles, axillary or on leafless branches. Fruit ellipsoidal, often with woody pericarp; seeds transverse-ellipsoid.

Sapwood of various shades of pinkish to reddish brown, often with a grayish cast; heartwood light to dark purplish brown or almost black, often perishable. Wood odorless and tasteless; fairly fine- to rather coarse-textured; light and fairly soft or firm to moderately heavy; sometimes fibrous, easy to work, and capable of taking a smooth and highly lustrous polish. Parenchyma terminal; widely or irregularly spaced, darker than background, and sometimes distinct. Pores moderately small to large; rather few, well scattered; solitary or in multiples; often filled with lustrous tyloses or dark gum. Rays fine and indistinct or rather broad and closely or widely spaced on cross section; sometimes barely visible to unaided eye on tangential; darker than background and distinct on radial surface; uniseriate or biseriate in part. Tanniniferous tubes often present.

Iryanthera juruensis Warb.(?), Verh. Bot. Ver. Brandenb. 47: 137. 1905. *Cumala del altura.*

Medium-sized tree, up to 55 feet tall. Crown conical. Trunk straight, cylindrical, 7 to 12 inches in diameter, and clear of branches for about half the entire height. Bark dark brown, smooth, and yields a small amount of thin, translucent resin when cut.—Of limited occurrence; in dense forest free from seasonal floods (alt. 400–800 ft.).

Sapwood thick, pale pinkish brown; heartwood dark reddish brown, perishable. Wood straight-grained; fine- or medium-textured; heavy, hard, and tough; takes a smooth and fairly lustrous finish; liable to check in drying. Parenchyma in widely spaced, concentric lines, appearing to indicate limit of growth rings. Pores small and visible only with lens. Vessel lines of same color or slightly darker than background and at limit of vision. Rays barely distinguishable with lens on cross and tangential sections; slightly darker than adjacent elements on radial.

Loreto: upper Nanay, *3461*.

Iryanthera leptoclada Markgr. Notizbl. Bot. Gart. Berlin 9: 965. 1926.

Forest tree, often up to 60 feet tall. Crown spreading. Trunk straight, cylindrical, 10 to 14 inches in diameter, and free of branches up to 27 feet. When incised the bark yields a moderate quantity of bitter, reddish brown resin. Fruit in clusters attached to trunk; October–November.—Not common; in dense, tall growth (alt. 500 ft.). Timber is used to some extent for general carpentry and construction.

Sapwood deep pinkish brown, sometimes with a grayish cast, and well defined; heartwood thin, dull reddish brown. Wood straight- or roey-grained; fine-textured; rather heavy and strong; takes a smooth, lustrous finish, and holds its place well when finished; durable. Vessels often filled with highly lustrous deposit.

Loreto: Yurimaguas, *4824*.

Iryanthera macrophylla (Benth.) Warb. Nova Acta Acad. Caes. Leop. Nat. Cur. 68: 155. 1897.

Forest tree, 30 to 100 feet in height. Crown conical or round; branches arranged in whorls about 2 feet apart. Trunk erect, cylindrical or somewhat compressed, 9 to 24 inches in diameter, and clear of limbs up to four-fifths its height. Bark grayish or dark reddish brown, fairly smooth, with short, low, vertical fissures, or scaly, and exudes a fair amount of thin, astringent, pale brown resin.

Flowers light brown. Fruit in clusters attached to branches; October–November.—Widely scattered, but not common; in dense growth free from seasonal inundations (alt. 380–450 ft.). Wood is employed for fuel and for general construction.

Sapwood yellowish brown with occasional darker brown streaks; heartwood deep pinkish brown. Wood odorless and tasteless; straight-grained; fine- or medium-textured; of medium weight to heavy and compact; saws slightly woolly, fairly easy to work, and takes a smooth finish with a moderate luster; probably durable. Growth rings faintly distinguishable owing to alinement of elements. Pores small; numerous to fairly numerous, well distributed; mostly in radial multiples or rows of 2–4, seldom more, less frequently solitary; open. Vessel lines visible, but not distinct; dark gum frequently present in vessels. Rays discernible only with lens on cross and tangential sections; darker than background on radial.

Loreto: Pebas, *1744;* Santa Rosa, lower Huallaga, *4817.*

Iryanthera paraensis Huber, Bol. Mus. Goeldi 5: 358. 1909. *Cumala.*

Forest tree, 35 to 70 feet tall. Crown open or conical. Trunk straight, columnar, 8 inches or more in diameter, and clear of limbs for more than two-thirds the height. Bark thin, smooth, slightly sweet, reddish or chocolate brown, and yields, when cut, a small amount of dark reddish brown resin. Leaves subcoriaceous, acute at base, narrow-oblong. Flowers very small, in fascicles. Fruit with a vertical groove, attached to trunk; October–November. In alturas (alt. 400–500 ft.). Wood is employed for fuel.

Wood variable from pale yellowish to russet brown with pale grayish cast; straight-grained; fine- and uniform-textured; of medium weight; takes a smooth finish; durable. Growth rings faintly visible owing to slight variation in depth of color. Parenchyma barely discernible with lens as broken, tangential or continuous, concentric lines. Pores small; fairly numerous, well distributed; mostly in radial multiples or rows of 2–3, less frequently solitary or in tangential pairs; open. Vessel lines short, fine; lustrous tyloses common. Rays indistinguishable to unaided eye on cross and tangential surfaces; at limit of vision on radial.

Loreto: La Victoria, *2869;* Santa Rosa, lower Huallaga, *4823.*

Iryanthera sessilis Markgr. Notizbl. Bot. Gart. Berlin 10: 236. 1928.

Small tree, not exceeding 27 feet in height. Crown spreading, densely branched. Trunk straight, cylindrical, 7 to 10 inches in diameter, and free of branches for about one-third the entire height. Bark dark chocolate brown, smooth, and exudes, when incised, a fair amount of watery, translucent, insipid sap. Leaves entire, simple, narrowly oblong, acuminate, acute at base; petiole short, stout. Flowers very small, subracemose; April–May.—Uncommon; in dense forest not subject to inundations (alt. 380 ft.). Timber is used to a limited extent for fuel.

Sapwood not distinctly defined, pale brown; heartwood reddish brown, perishable. Wood of medium weight, firm; easy to work and takes a highly lustrous polish; susceptible to insects. Parenchyma lines evenly spaced. Vessel lines rather fine and at limit of vision; pale gray and iridescent deposits frequently present in vessels. Rays produce a rich golden figure on radial surface.

Loreto: Pebas, *1613*.

Iryanthera Tessmannii Markgr. Notizbl. Bot. Gart. Berlin 10: 236. 1928. *Cumala.*

Tall shrub or small tree, 12 to 25 feet tall. Crown spreading. Trunk straight, round, slender, and free of branches for 5 to 10 feet. Bark in young trees light brown, in older trees dark purplish or chocolate brown, with small lenticels, and scaly. Flowers small, with yellowish green corolla; May–June.—Common throughout the lowland, especially near the Peruvian-Brazilian boundary (alt. 380 ft.); in dry or humid loam in dense forest.

Sapwood distinctly demarcated, pinkish brown, occasionally with grayish streaks caused by sapstain; heartwood dark purplish brown. Wood has no distinctive taste, but odor slightly spicy; straight-grained; medium-textured; easy to cut, and takes a smooth finish; susceptible to insect attacks; not durable. Pores small; few and well scattered; solitary or in small radial multiples. Rays fine, faintly visible with lens on cross and tangential surfaces; darker than adjacent elements and distinguishable to naked eye on moistened radial; cells frequently filled with minute, dark brown globules of gum.

Loreto: lower Itaya, *58;* Caballo-cocha, *2403;* La Victoria, *2677, 2815, 2820, 2902, 2952;* lower Huallaga, *4815*.

3. OSTEOPHLOEUM Warb.

Osteophloeum platyspermum (A. DC.) Warb. Bericht. Deutsch. Bot. Ges. 13: General-Vers. (89). 1895.

Tall tree, up to 125 feet in height. Crown spreading. Trunk erect, cylindrical, 30 inches or more in diameter, and clear of branches up to half the entire height. Bark about 1 inch thick, dark reddish brown, and with long, coarse scales; inner bark separates into large and fairly thin flakes.—Uncommon; in dense forest free from periodical inundations or in slightly humid loam (alt. 380 ft.).

Sapwood pale yellow throughout when fresh, turning to pale brown when exposed, with darker brown striping of vessel lines; heartwood of dark chocolate color. Wood odorless and tasteless; straight-grained; medium-textured; not very easy to work, takes a moderately lustrous finish; likely to check in drying; durable. Growth rings absent. Parenchyma in very fine, irregularly spaced, continuous, concentric lines; indistinct or visible with lens. Pores appear as fine pinpoints; fairly numerous, well distributed; solitary or in radial multiples of 2–3. Vessel lines long, coarse, and of darker color than adjacent elements; lustrous or pale brown deposits frequently present in vessels. Rays rather fine, wavy, and visible with lens on cross section; at limit of vision on tangential; of darker color than background and rather conspicuous on radial surface.

Vessel-ray pits bordered or half-bordered; intervascular pits large, half-bordered. Rays heterogeneous.

Loreto: La Victoria, *3140*.

4. VIROLA Aubl.

Tall shrubs or small to large trees. Leaves alternate, entire, short-stalked, oblong, acute or acuminate, and without stipules. Flowers small and inconspicuous, arranged in small, stalked, axillary panicles. Fruits similar in size and appearance to nutmeg (*Myristica fragrans* Houtt.) of the East Indies, to which they are closely related. The better quality timber appears to be suited for purposes for which we use birch (*Betula*).

Sapwood variegated light brown, often with a grayish cast; heartwood pinkish to dark purplish brown. Wood, when fresh, sometimes slightly fragrant; fairly fine- or medium-textured; moderately light to rather heavy; sometimes inclined to be fibrous or splintery, takes a highly lustrous polish; checks in drying; fairly durable. Parenchyma sparingly developed and not visible with lens. Pores fairly small to moderately large; not numerous to numerous, diffuse- or showing a tendency to ring-porous; predominantly solitary, also in radial multiples, infrequently in rows or clusters; black gum or lustrous calcium deposits common. Rays fairly fine to moderately

distinct, numerous, and unevenly spaced on cross section; numerous and at times barely visible to unaided eye on tangential; distinct on radial surface, sometimes producing silver grain.

Vessel perforations simple to scalariform with a few distinct bars. Rays heterogeneous; uniseriate or biseriate in part.

Virola calophylla (Spruce) Warb. Nova Acta Acad. Caes. Leop. Nat. Cur. 68: 231. 1897. *Cumala blanca.*

Medium-sized tree, up to 70 feet tall. Crown spreading. Trunk straight, cylindrical, slender, unbranched for 40 or 50 feet, and with small buttresses. Bark dark reddish brown with small scales. Leaves coriaceous, oblongate or oblong-ovate, cordate at base, acute or abruptly acuminate at tip. Inflorescence paniculate; flowers brown. Fruit round, bivalvate, dark brown, and dehiscent; seeds inclosed in a pulp which is used locally as a substitute for soap; maturing in July.—Not common; in dense, flood-free forest (alt. 450 ft.).

Sapwood distinctly demarcated, lustrous pinkish brown; heartwood dull reddish brown. Wood has a faintly spicy odor, but taste absent or not distinctive; of fairly light or medium weight; straight-grained; medium-textured; saws rather woolly, easy to work, takes a smooth finish, and holds its place well. Growth rings absent. Parenchyma indistinct. Pores of medium size and at limit of vision; not numerous or numerous and well distributed; mostly in radial multiples of 2–3, sometimes 5, also solitary; open. Vessel lines appear as fine, fairly long scratches; lustrous deposits sometimes present. Rays numerous, closely spaced, and visible only with lens on cross section; indistinct or faintly discernible to aided eye on tangential; sometimes at limit of vision on radial surface.

Loreto: upper Nanay, *978;* upper Itaya, *3291.*

Virola cuspidata (Benth.) Warb. op. cit. 176. *Cumala.*

Tree, at times up to 130 feet in height. Crown flat or spreading; branches sometimes arranged in whorls. Trunk straight or slightly bent, round or moderately round, up to 19 inches in diameter, and unbranched for two-thirds the entire height. Bark dark brown with a grayish tinge and numerous short fissures; inner bark coarsely fibrous or separates into long flakes; when cut exudes a bitter, pale brown resin. Flowers small, yellowish brown, and fragrant. Fruit ovoid, about 1 inch long, brown when mature; June–July.—Common in the lower Peruvian Amazon; in dense, flood-free forest (alt. 400 ft.).

Wood tan or light brown throughout; has no distinctive odor or taste; straight-grained; moderately fine-textured; of fairly light or medium weight; easy to work, inclined to be fibrous, takes a moderately smooth finish; appears to be durable. Growth rings absent. Parenchyma indistinct. Pores small; not very numerous, well distributed; mostly solitary, also in radial multiples of 2–3, seldom in tangential pairs or small clusters; open or infrequently filled with white deposit. Vessel lines moderately fine or rather coarse and of darker color than background. Rays rather fine, numerous, and visible with lens on cross and tangential sections; indistinct or at limit of vision on radial. Pith dark reddish brown; grayish white deposit common.

Loreto: Caballo-cocha, *2409;* La Victoria, *2526, 2552, 2660, 2839, 2875.*

Virola cuspidata var. **membranacea** (DC.) Warb. op. cit. 177.

Tall shrub or small tree, up to 21 feet in height. Crown open. Trunk slender, branching about 2 feet from the base or undivided up to 9 feet. Bark dark brown with a grayish tinge and rather coarse, short ridges; inner bark fibrous; when incised exudes a small amount of bitter, brown resin. Flowers small, reddish with a yellow tinge; June–July.—Not common; in dry or humid loam along margin of dense forest (alt. 380 ft.).

Sapwood well defined, yellowish or light brown with a pale grayish cast; heartwood dark purplish or chocolate brown. Wood has no distinctive odor or taste; straight-grained; moderately fine-textured; light in weight and easy to cut. Growth rings absent or inconspicuous. Parenchyma indistinct. Pores fairly small; moderately numerous, well distributed; solitary or in radial multiples of 2–3. Vessel lines fairly fine, of darker color than background, and at limit of vision. Rays numerous, fine, closely spaced on cross section; visible with lens on tangential section; not discernible without lens on radial surface.

Loreto: Caballo-cocha, *2404;* La Victoria, *2626.*

Virola loretensis A. C. Smith, Bull. Torrey Club 58: 95. 1931. *Cumala.*

Tree, 20 to 35 feet in height. Crown open or pyramidal. Trunk straight or moderately straight, round, slender, and unbranched for 15 or 18 feet. Bark dark brown, fissured or with small scales, and secretes a small amount of bitter, red resin; inner bark slightly fibrous. Flowers greenish yellow. Fruit small and the pulp is rich in

oil and edible; seeds employed as a substitute for soap; maturing in June–July.—Fairly common in the lowland; in dense forest not subject to seasonal floods (alt. 380–400 ft.).

Wood pale brown throughout; fresh wood slightly fragrant, but tasteless; straight-grained; fine- or medium-textured; of light or medium weight; slightly fibrous, easy to cut, takes a smooth polish with a moderate luster, and holds its place well when finished. Growth rings absent or poorly defined. Parenchyma indistinct. Pores small; rather few, well scattered; solitary or in radial multiples of 2–3. Vessel lines moderately fine, darker than background, and at limit of vision. Rays fine, numerous, and distinguishable with lens on cross and tangential sections; slightly darker than adjacent elements and visible without lens on radial surface.

Loreto: Caballo-cocha, *2264;* upper Itaya, *3289, 3447.*

Virola Mocoa (DC.) Warb. Nova Acta Acad. Caes. Leop. Nat. Cur. 68: 183. 1897.

Small tree, about 30 feet in height. Crown wide-spreading. Trunk erect, round, 7 inches in diameter, and unbranched up to 20 feet. Bark reddish brown with a grayish tinge, and exudes when incised a small amount of bitter, brown resin; inner bark fibrous. Fruit subround, reddish brown; February–March.—Rare; in old clearings or along margin of dense forest free from periodical floods (alt. 3,500 ft.).

Wood pale pinkish brown and darkening on exposure; odorless and tasteless; straight- or fairly straight-grained; medium-textured; light in weight; easy to work and holds its place well when finished. Growth rings present, but inconspicuous; visible owing to arrangement of elements. Parenchyma indistinct. Pores of medium size and barely at limit of vision; fairly numerous and show a tendency to zonate arrangement; in radial multiples of 2–4, sometimes more, less frequently solitary or in diagonal or tangential pairs; open or filled with pale yellowish white deposit. Vessel lines numerous, fairly fine, and at limit of vision; iridescent deposits frequently present. Rays numerous, fine, closely spaced, slightly wavy on cross section; discernible with lens on cross and radial surfaces. Pith medium brown; pale white deposit common.

San Martín: San Roque, *7634.*

Virola mollissima (DC.) Warb. op. cit. 167. *Cumala.*

Tree, 80 feet tall. Crown spreading. Trunk erect, columnar, 12 inches in diameter, and unbranched up to three-fourths the entire

height. Bark chocolate brown, with narrow, light gray scales; inner bark separates into long flakes; bark and pith when cut exude a fair quantity of insipid, red resin. Leaves densely pubescent. Flowers brown; June–July.—Not common; in dense, flood-free forest (alt. 400 ft.).

Wood pale brown; has a rather fetid odor, but tasteless; straight-grained; medium- or rather coarse-textured; inclined to be fibrous, easy to work, holds its place well when finished; fairly durable. Growth rings present owing to alinement of elements and variation in depth of color. Parenchyma indistinct. Pores at limit of vision; fairly numerous and show a tendency to zonate arrangement; in radial multiples of 2–3, less frequently solitary, seldom in small clusters; open or filled with dark brown gum. Vessel lines long and distinct owing to gum present. Rays numerous, fairly fine, and discernible only with lens on cross and tangential sections; reddish brown and visible without lens against the lighter background on radial. Pith dark reddish brown.

Loreto: La Victoria, *3077*.

Virola officinalis (Mart.) Warb. op. cit. 228.

Tree of the lowland, up to 120 feet in height. Crown flat. Trunk straight, cylindrical, 28 inches in diameter, and unbranched up to 90 feet. Bark dark brown with a grayish cast, moderately smooth; inner bark slightly fibrous. Leaves glabrous above, light brown and pubescent beneath, up to 3.5 inches long and 1.5 inches in width. Fruit subround, in small clusters; October–November. —Uncommon; in fairly dense forest not subject to periodical floods (alt. 500 ft.). Timber is used to a limited extent for the construction of houses.

Sapwood well defined, pale yellowish brown and darkening on exposure; heartwood dark brown. Wood slightly fragrant, but tasteless; straight-grained; medium-textured or moderately so; light in weight, but firm and strong; not difficult to work, holds its place well when finished; durable. Growth rings present, but poorly defined; visible owing to slight variation in abundance of elements. Parenchyma indistinct. Pores fairly small; moderately numerous, well scattered or show a tendency to zonate arrangement; mostly in radial multiples of 2–3, also solitary, seldom in small clusters; open or filled with pale white deposit. Vessel lines moderately fine, darker than adjacent elements, and at limit of vision. Rays numer-

ous, fine, and visible with lens on moistened cross and tangential sections; at limit of vision on radial surface.

Loreto: lower Huallaga, *4423*.

Virola sebifera Aubl. Pl. Guian. 2: 904. *pl. 345*. 1775. *Cumala.*

Tree, 50 to 75 feet in height. Crown flat or round. Trunk straight, cylindrical, up to 12 inches in diameter, and unbranched for 20 to 55 feet. Bark reddish or dark brown with a grayish cast and rather coarse, broad, low ridges; inner bark separates into coarse flakes; exudes when cut a fair quantity of bitter, turbid resin. Leaves subcoriaceous, ovate or oblong, acute or acuminate at tip, often shiny. Flowers in axillary or terminal panicles. Fruit ovoid, smooth, and reddish brown when mature; January–February.—Not common; in sandy or dry, medium loam among low trees of second growth or in open patches in flood-free forest (alt. 1,500–3,500 ft.).

Sapwood well defined, pale pinkish brown; heartwood medium brown. Wood odorless and tasteless; straight-grained; medium-textured or moderately so; of medium weight; not difficult to work, holds its place well when finished; susceptible to stain and insect attacks. Growth rings absent or present owing to variation in abundance of pores. Parenchyma indistinct. Pores of medium size and at limit of vision; fairly numerous, well distributed; in radial multiples of 2–4, infrequently solitary or in small clusters; open. Vessel lines numerous, of darker color than background and distinct; grayish or reddish to dark brown deposits common. Rays moderately fine, numerous, closely spaced, slightly wavy, and discernible only with lens on cross section; faintly distinguishable to aided eye on tangential; at limit of vision on radial surface when held to proper light.

San Martín: Tarapoto, *6615;* San Roque, *6953*.

Virola Weberbaueri Markgr. Notizbl. Bot. Gart. Berlin 9: 965. 1926. *Caupuri.*

Tree, up to 90 feet tall. Crown round or spreading. Trunk straight, round, 28 inches in diameter, unbranched for four-fifths the entire height, and with several tall surface roots. Bark grayish or dark reddish brown; inner bark yellowish or pale brown and separates into coarse flakes; wood and bark, when cut, yield a small quantity of reddish resin. Fruit small, round; seeds black, ovoid; May–June.—Uncommon; in humid loam in dense forest (alt. 450 ft.).

Wood almost white or creamy yellow with long grayish brown streaks; has no characteristic odor or taste; straight-grained; medium-

textured; light, but strong for its weight; inclined to be splintery, easy to work, and takes a smooth finish. Growth rings absent. Parenchyma in association with pores, inconspicuous. Pores barely at limit of vision; not numerous, well scattered; in radial multiples of 2–3 and less frequently solitary; open. Vessel lines rather prominent against the lighter background. Rays fairly numerous, evenly spaced, lighter-colored than adjacent fibers, and readily distinguishable to aided eye on moistened cross section; faintly distinguishable with lens and reddish brown on tangential; visible without lens on radial surface when held to proper light; small brown globules of gum present in the rays and discernible with lens. Pith grayish brown with reddish brown streaks; lustrous deposit common.

Loreto: upper Nanay, *1166*.

MONIMIACEAE. Monimia Family

Trees or shrubs, rarely climbers, often aromatic and confined chiefly to the tropics and subtropics of the southern hemisphere. Leaves opposite, short-stalked, toothed or entire, without stipules. Flowers small, greenish, axillary, in small panicles or fascicles, with 4 sepals, no petals, and usually with numerous stamens. Fruit composed of numerous small fleshy carpels.

Woods range in color from white or pale yellow to light or chocolate brown or almost black; fairly light and soft to moderately heavy and hard; those from Peru are fairly fine-textured; easy to work; not durable. Growth rings usually more or less distinct, being delimited by narrow zones of denser wood, sometimes supplemented by more or less broken parenchyma lines or diffuse parenchyma strands. Pores solitary or in multiples of 2–3, at times 4–5 or more.

Vessel perforations predominantly simple to almost exclusively scalariform; intervascular pit-pairs of two types: (*a*) fairly small to large, and transitional from opposite to scalariform; (*b*) of small to medium size or rather large and distinctly alternate in arrangement; vessel-ray pits simple to bordered, also of two types: (*a*) large, elliptical, and in scalariform arrangement; (*b*) rather small and resembling the intervascular pit-pairs. Wood fibers often septate and with simple or bordered pits. Rays distinctly heterogeneous; uniseriate or multiseriate, up to 16 cells wide.

1. MOLLINEDIA Ruiz & Pavón

Shrubs or small trees. Leaves entire or dentate. Flowers pedicellate, in axillary cymes. Fruit consists of numerous small drupes.

Sapwood whitish or yellowish brown; heartwood pinkish to dark brown. Wood tasteless and odorless; fine- or very fine-textured; of light to medium weight; easy to work; not very durable. Parenchyma indistinct. Pores small or very small; fairly numerous and well scattered; predominantly solitary, also in small multiples; open. Rays fine or rather distinct on cross section; occasionally visible to unaided eye on tangential and radial surfaces.

Vessel perforations scalariform and with many bars; vessel-ray pits large, elliptical, half-bordered. Rays distinctly heterogeneous; 3–4 cells wide. Wood fibers with simple pits.

Mollinedia casca Macbr. Candollea 5: 352. 1934.

Small tree, approximately 30 feet in height. Crown spreading. Trunk erect, cylindrical, slender, and unbranched for about 10 feet. Bark pinkish or grayish brown, fairly smooth. Not abundant; in open dry loam among shrubs and low trees or along edge of dense forest (alt. 550 ft.). Wood used for fuel only.

Sapwood well demarcated, yellowish brown with characteristic darker markings of rays; heartwood pale purplish brown. Wood with no characteristic taste, but slightly fragrant; roey- or wavy-grained; medium- or rather coarse-textured; of medium weight; splinters readily, easy to cut, takes a smooth, lustrous finish with an attractive figure; liable to stain and to be damaged by insects. Growth rings present, but not well defined. Parenchyma indistinct. Pores minute or small; not numerous, well distributed; solitary or in radial multiples of 2–4, infrequently in diagonal pairs; mostly open. Vessel lines distinguishable only with lens; vessels frequently filled with lustrous deposit. Rays prominent on all surfaces, especially on cross and radial sections. Pith yellowish brown.

Rays decidedly heterogeneous; 3–4 cells wide.

Loreto: San Ramón, lower Huallaga, *4585*.

Mollinedia caudata Macbr. Candollea 5: 351. 1934.

Tall shrub or small tree, up to 15 feet in height. Trunk slender, bent, and free of branches up to 6 feet. Bark pale pinkish brown. Fruit ovoid, dark blue; June–July.—Fairly common in lower Peruvian Amazon region; forms undergrowth in dense forest (alt. 380 ft.).

Sapwood well defined, yellowish; heartwood pinkish brown. Wood uniformly fine-textured; takes a smooth and fairly lustrous finish. Growth rings present. Parenchyma and pores indistinct with lens. Rays fine, wavy, at times invisible.

Loreto: Pebas, *1602*.

Mollinedia simulans Macbr. Candollea 5: 352. 1934.

Shrub, about 9 feet tall. Crown conical. Trunk slender and branching 2 or 3 feet from the base. Bark light brown or deep purple and fairly smooth. Fruit ovoid, clustered; February–March.—Uncommon; forming understory in fairly dense forest (alt. 3,500 ft.).

Wood lustrous yellow with a grayish tinge of the distinct rays; wavy-grained; medium-textured; light in weight, but firm; cuts easily and takes a smooth finish. Growth rings absent or indistinct. Pores small and visible only with lens; mostly solitary; open or closed. Rays white, broad, and prominent on cross section; distinguishable, but not conspicuous, on tangential; pale grayish brown and producing a characteristic figure on radial surface. Pith pale brown.

San Martín: San Roque, *6977*.

2. SIPARUNA Aubl.

Trees or shrubs, with entire, glabrous leaves. Flowers in short axillary cymes or racemes and usually short-pedicelled. Fruit consists of numerous small drupes.

Sapwood creamy white to pale or fairly dark brown; heartwood dark brown or almost black. Wood odorless and tasteless; fine- or moderately fine-textured; light and soft to fairly hard and firm; takes a lustrous finish. Parenchyma in numerous, exceedingly fine lines extending between the rays or in short tangential bands. Pores of small or medium size; few to numerous and well distributed; in radial multiples or rows, less frequently solitary; mostly open. Rays fine to fairly distinct and often sinuous on cross section; occasionally high and distinct on radial surface.

Vessels with scalariform perforation plates; vessel-ray pits half-bordered. Rays decidedly heterogeneous.

Siparuna bifida (Poepp. & Endl.) A. DC. Prodr. 16, pt. 2: 652. 1864.

Tall shrub or small tree, seldom exceeding 27 feet in height. Crown open or almost flat. Trunk stout and branching 12 feet or so from the base. Bark dark rufous brown, scaly or with numerous, short, coarse depressions.—Fairly common in some localities; in thickets, in dense forest, or along banks of streams (alt. 500 ft.).

Wood pale creamy yellow with a grayish cast, not sharply demarcated into sap and heart; tasteless, but has a faintly fragrant odor; straight- or interwoven-grained; fine-textured; of medium weight;

not difficult to work, takes a smooth polish; checks in drying; fairly durable. Growth rings present owing to variation in depth of color. Parenchyma in numerous, very fine, short lines extending between the rays and barely distinguishable with lens. Pores small; fairly numerous, well distributed; in radial multiples or rows of 2–3, less frequently tangentially disposed or solitary. Vessel lines fine, of same color as background, and faintly at limit of vision. Rays lighter-colored than fibers and barely discernible without lens on cross section; indistinct on tangential and radial surfaces.

Loreto: lower Nanay, *624;* upper Itaya, *3539.*

Siparuna cervicornis Perk. Verh. Bot. Ver. Brandenb. 47: 145. 1905.

Slender tree, about 25 feet in height. Crown spreading. Trunk erect, round, and free of branches for about half the entire height. Fruit small, yellowish brown when mature; August–September.—Uncommon; in dry loam along margin of dense forest (alt. 380 ft.).

Wood pale yellowish or light brown, not sharply demarcated into sap and heart; odorless and tasteless; straight- or interwoven-grained; of moderately fine texture; of medium weight; easy to cut, takes a dull polish, and holds its place well when finished; probably durable. Growth rings present or poorly defined. Pores small; fairly numerous, well scattered; solitary or in small radial multiples or rows. Vessel lines fine; often filled with grayish white and lustrous deposits. Rays moderately fine, wavy, and faintly discernible to unaided eye on moistened cross section; indistinct on other surfaces. Pith pale brown.

Loreto: La Victoria, *2706.*

Siparuna Gilgiana Perk. Notizbl. Bot. Gart. Berlin 10: 161. 1927. *Pampa-orégano-mashan.*

Small tree, not exceeding 30 feet in height. Crown spreading. Trunk bent, somewhat compressed, slender, and unbranched for about a third of the entire height. Bark grayish white to dark brown, with rounded, shallow ridges. Leaves opposite, membranaceous. Flowers in short, axillary cymes. Fruit a small drupe; July.—Fairly common; in dense, flood-free or periodically inundated forest of the lower Itaya and lower Huallaga (alt. 400–500 ft.).

Sapwood sharply demarcated, light brown and at times with a pale yellowish or pinkish cast; heartwood dark brown, perishable. Wood odorless and tasteless; interwoven-grained; fine-textured; of light weight; rather fibrous, but takes a smooth finish. Growth rings

absent or poorly defined. Pores small; fairly numerous. Vessel lines fine; often containing lustrous deposits. Rays barely at limit of vision on moistened cross section; slightly darker than background and discernible without lens on radial surface.

Loreto: near Iquitos, *1405*.

Siparuna guianensis Aubl. Pl. Guian. 2: 865. *pl. 333*. 1775. *Curuinsi-sacha, Isula-micunan.*

Shrub, 8 to 18 feet tall. Trunk round, fairly straight, and undivided for one-third the entire height. Bark pale to dark chocolate brown, with long, straight or undulating, low but prominent ridges. Young leaves and twigs yellow, stellate-hairy; adult glabrous. Flowers in cymes or racemes. Fruit round, pale red when mature; March–April.—Fairly common; forming undergrowth in dense forest (alt. 400–3,500 ft.).

Sapwood pale brown; heartwood darker brown. Wood odorless and tasteless; straight- or interwoven-grained; moderately fine-textured; heavy, tough, and strong; of medium weight; rather splintery, fairly easy to work, and holds its place well. Growth rings present or poorly defined. Pores small or fairly small; rather numerous, well scattered; in small radial multiples or rows, less frequently solitary or in small clusters. Vessel lines fine; often containing lustrous deposits. Rays faintly visible without lens on cross and radial surfaces. Pith light brown, with specks of black gum.

Loreto: near Iquitos, *1510*.—San Martín: Tarapoto, *6674;* herbarium material collected also at Lamas and San Roque.

Siparuna magnifica Perk. Bot. Jahrb. 28: 699. 1901.

Shrub, about 10 feet tall, with few branches confined to the summit. Bark dark chocolate brown with long, low, rounded ridges. Fruit round and red when mature; June–July.—Uncommon; in sandy loam in thickets and old clearings (alt. 380 ft.).

Wood light brown with pale pinkish tinge; odorless and tasteless; straight-grained; moderately fine-textured; light in weight and rather soft; requires a sharp knife to cut smoothly across grain. Growth rings absent or poorly defined. Pores small; fairly numerous and well scattered; in radial multiples or rows up to 5 or more, less frequently solitary. Vessel lines fine; vessels often filled with lustrous deposits. Rays fairly fine and evenly spaced; sometimes discernible without lens on moistened cross and radial sections; dark brown

specks of gum often visible with lens in cells on radial section. Pith light to dark brown.

Loreto: near Pebas, *1783*.

Siparuna plana Macbr. Candollea 5: 355. 1934. *Isula-micunan.*

Shrub, about 8 feet tall. Flowers small, yellow; November–December.—Uncommon; in open dry loam or along margin of forest (alt. 500 ft.).

Loreto: San Ramón, lower Huallaga, *4584*.

Siparuna Poeppigii (Tul.) A. DC. Prodr. 16, pt. 2: 653. 1864.

Shrub, about 15 feet tall, with many branches and short, slender trunk. Bark pale brown with a grayish cast and undulating, long or short ridges. Flowers small, yellow. Fruit round and red when mature; October–November.—Of limited distribution; in dry medium loam along edge of dense forest (alt. 500 ft.).

Wood pale brown; straight- or interwoven-grained; fine-textured; of fairly light or medium weight, firm and strong, but rather splintery; takes a smooth, dull finish. Growth rings present owing to alinement or absence of parenchyma. Pores of small or medium size; not very numerous, well distributed; in radial multiples or rows of 2–6, less frequently in tangential pairs or solitary; open. Vessel lines fine; vessels often filled with pale white or bluish deposits. Rays rather fine, evenly spaced, and faintly discernible to unaided eye on moistened cross section; indistinct on tangential; slightly darker than background and distinguishable without lens on moistened radial surface; cells on radial section often filled with small, dark brown globules of gum.

Loreto: near Yurimaguas, *3833*.

Siparuna thecaphora (Poepp. & Endl.) A. DC. Prodr. 16, pt. 2: 657. 1864. *Curuinsi-sacha, Isula-caspi, Limón del monte, Macusaro, Sacha-limón.*

Tall, often straggly, shrub, attaining a height of 18 feet. Trunk unbranched up to 9 feet. Bark pinkish or dark rufous to chocolate brown, fissured; wood beneath bark usually dark brown. Flowers small, in axillary cymes. Drupe indehiscent, reddish pink. Leaves, fruit, and fresh wood have a distinct and characteristic spicy odor.

Wood pale yellow or light pink, often becoming dark brown when dried; variable in weight from light to moderately heavy; straight- or interwoven-grained; fine-textured; easy to cut; not durable. Growth rings absent or present owing to absence of parenchyma.

Pores small; numerous and well distributed; occurring in radial rows of 2–7, and less frequently solitary; open. Vessel lines fine and of same color as background. Rays visible without lens on cross section; indistinct on tangential; visible in some specimens without lens on radial surface. Pith almost white or pale brown, with abundant lustrous white or iridescent deposit suggesting raphides.

Loreto: lower Nanay, *639;* Caballo-cocha, *2024, 2094, 2142;* upper Itaya, *3283, 3411.*

Siparuna Williamsii Macbr. Candollea 5: 353. 1934.

Tree, about 40 feet in height. Crown spreading. Trunk moderately straight, round, slender, and unbranched up to half the entire height. Bark yellowish or light brown and fairly smooth. Flowers pale yellow; July–August.—Uncommon; in dense, flood-free forest (alt. 500 ft.).

Wood pale brown with occasional broad and slightly darker brown streaks; odorless and tasteless; interwoven-grained; fine- to medium-textured; of medium weight to rather heavy; not easy to work, inclined to be fibrous, and takes a dull polish; appears to be durable. Growth rings present owing to variation in abundance of parenchyma. Pores mostly small; not very numerous, scattered; solitary or in small radial multiples or rows; mostly open. Vessel lines fine and indistinct. Rays of lighter color than fibers and barely at limit of vision on cross section; indistinct on tangential; occasionally discernible without lens on radial surface.

Loreto: upper Itaya, *3371.*

LAURACEAE. Laurel Family

Aromatic trees or shrubs, rarely epiphytic herbs, of which there are approximately 39 genera and more than 1,000 species distributed mainly in tropical and subtropical regions, and with a few representatives in the temperate zone. To this family belongs our common sassafras (*Sassafras officinale* Nees & Eber.). Leaves alternate, entire, usually leathery, and without stipules. Flowers small, white, greenish, or yellowish. Fruit drupe-like, 1-seeded, surrounded at the base by the persistent cup-like calyx tube, the whole often resembling an acorn with its cup. Many of the members are large and important timber trees, others are the source of such well-known aromatic products as camphor, cinnamon, and cloves.

The Peruvian species are oatmeal-colored to light brown, often with a grayish cast or streaked; heartwood ranging from pale brown to dark purplish brown or nearly black, and often fragrant. Woods

variable from fairly light and soft to very heavy and hard. Growth rings absent, poorly defined, or distinct; when present, usually indicated by thick-walled fibers, or in some cases by terminal parenchyma. Wood parenchyma usually abundantly developed; paratracheal and diffuse. Pores diffuse except in *Sassafras* where they are distinctly ring-porous.

Vessel perforations usually exclusively simple; intervascular pit-pairs mostly large, more or less crowded, and alternate, with narrow lenticular or oval to slit-like apertures; vessel-ray pits completely bordered to simple. Rays variable from homogeneous to distinctly heterogeneous; 1–4 cells wide, sometimes up to 8 cells, but mostly biseriate or triseriate. Wood fibers with small and rather indistinct, simple pits; septate fibers often present. Oil cells frequently present in wood parenchyma strands or in rays.

1. ACRODICLIDIUM Nees

Acrodiclidium armeniacum (Nees) Mez, Jahrb. Bot. Gart. Berlin 5: 85. 1889. *Moena, Moena colorada.*

Tree, up to 50 feet in height. Crown spreading. Trunk slender and unbranched for 10 feet. Bark grayish brown or almost black and with coarse lenticels. Fruit edible; April–May.—Common in the lowland; in dense forest (alt. 400 ft.).

Sapwood pale yellowish brown and darkening on exposure to air; heartwood medium to dark chocolate brown. Wood has a strong spicy odor and a bitter taste; of medium weight to fairly heavy; moderately straight-grained; medium-textured; not difficult to work, takes a smooth finish; liable to check, but does not stain, in drying; immune to insects; durable. Growth rings present owing to variation in abundance of elements and slight difference in depth of color. Parenchyma paratracheal; indistinct or visible on moistened surface. Pores of medium size; fairly numerous, uniformly distributed; in radial multiples of 2–4 and less frequently solitary; mostly open. Vessel lines of same color as background, fine, and barely visible. Rays moderately fine, fairly numerous, and evenly spaced on cross section; faintly distinguishable without lens on other surfaces when moistened.

Loreto: lower Itaya, *64*.

2. AJOUEA Aubl.

Ajouea Jelskii Mez, Jahrb. Bot. Gart. Berlin 5: 33. 1889. *Moena del agua, Yaco-moena.*

Tree, 45 or 50 feet in height. Crown spreading or conical. Trunk straight, round, 20 inches in diameter, and unbranched for 30 feet. Bark rufous brown and fairly smooth. Flowers small, white, with persistent calyx; May–June. Fruit yellowish when mature.—Fairly common in the lowland; in open sandy or light loam, usually along banks of streams (alt. 500 ft.). Timber is used for sugar boxes and crates.

Sapwood lustrous light brown with pale grayish streaks caused by sapstain; heartwood reddish brown and susceptible to ant attacks. Wood odorless or very slightly fragrant, tasteless; of moderately light to medium weight, firm; straight- or moderately straight-grained; medium-textured; easy to work, takes a smooth finish, and holds its place well. Growth rings absent. Parenchyma surrounding the pores; not distinct. Pores of medium size; fairly numerous, uniformly distributed; solitary or less frequently in small radial multiples; open. Vessel lines short and darker than adjacent elements; lustrous tyloses common in vessels. Rays moderately fine, numerous, and visible only with lens on cross and tangential sections; barely distinguishable to unaided eye on moistened radial surface.

Loreto: upper Nanay, *1090*.

3. ANIBA Aubl.

Medium-sized or small trees, common in the lowland and less abundant in the upland (at alt. of 380–3,500 ft.). Wood yellowish or pale brown, often with grayish cast or black streaks; has a spicy odor characteristic of the laurels; of light weight to moderately heavy; fairly fine- or medium-textured; easy to work, takes a lustrous finish; moderately durable. Parenchyma paratracheal. Pores of medium size; fairly numerous or numerous; predominantly solitary; open. Rays rather fine or fairly distinct on cross section; occasionally barely discernible to unaided eye on tangential; moderately distinct or distinct on radial surface.

Vessels with simple perforations; intervascular pits fairly large, with round or angularly round apertures. Rays heterogeneous; mostly 2–3 cells wide, and few to 20 cells high. Wood fibers with simple pits; sometimes septate. Thin-walled oil cells have been observed in the rays and parenchyma strands of some species.

Aniba amazonica (Meisn.) Mez, Jahrb. Bot. Gart. Berlin 5: 69. 1889. *Moena amarilla, Pushiri, Quillo moena.*

Tree of the lowland forest, about 20 feet tall, although reported to attain greater height. Crown spreading. Trunk slender, straight, round, and free of branches for 3 or 4 feet. Bark reddish or dark purplish brown.—Usually in sandy loam or in the vicinity of watercourses (alt. 500 ft.); previously reported by Poeppig in the lower Huallaga and by Rusby in Bolivia, at the junction of Madre de Dios and Beni rivers. Timber has no local application except for kindling.

Sapwood sharply defined, yellowish brown, and highly lustrous; heartwood thin, dark brown. Wood tasteless, but has a fragrant odor suggesting camphor; moderately straight-grained; fairly fine-textured; moderately heavy and firm; easy to work, takes a smooth finish; not durable. Growth rings present owing to variation in depth of color. Parenchyma indistinct. Pores small and distinguishable only with lens; fairly numerous, well distributed; solitary or in small radial multiples; open or closed. Vessel lines fine, but discernible without lens; lustrous deposits frequently present. Rays barely at limit of vision on cross section; indistinct on tangential; prominent against the lighter-colored background on radial surface.

Loreto: upper Nanay, *724*(?); lower Huallaga, *4287*(?), *5297*.

Aniba Williamsii O. C. Schmidt, Repert. Sp. Nov. 31: 169. 1933. *Moena amarilla.*

Tree, about 40 feet tall. Crown spreading. Trunk straight, round, 7 to 10 inches or more in diameter, and free of branches for about 15 feet. Bark thick, yellowish brown.—Uncommon; in flood-free forest (alt. 450 ft.).

Sapwood yellowish brown with occasional dark patches; heartwood reddish brown. Wood rather heavy, strong; saws slightly woolly; liable to check in drying.

Loreto: San Antonio, upper Itaya, *3495*.

4. ENDLICHERIA Nees

Small or medium-sized to fairly tall forest trees, very common in some localities in the lowland. Sapwood variable in color from whitish or yellowish to pink or dull brown, usually with a grayish cast; heartwood pale to dark chocolate brown. Wood sometimes slightly fragrant; medium-textured; of light to medium weight; inclined to be fibrous, easy to work, takes a fairly lustrous polish; moderately durable. Parenchyma paratracheal. Pores of medium size; fairly numerous or numerous and well distributed; solitary or

in radial multiples or rows; open. Rays fine or moderately fine on cross section; sometimes moderately distinct on tangential; at times producing silver grain on radial surface. Oil cells present in the rays, appearing on cross section as intercellular canals.

Vessels with simple perforation plates. Rays heterogeneous and show some tendency to homogeneous; mostly from 2–3 cells wide.

Endlicheria anomala Nees in Mart. Fl. Bras. 5, pt. 2: 283. 1866. *Canela-moena, Moena del agua.*

Slender tree, up to 25, at times 40, feet in height. Crown spreading. Trunk straight or inclined, round or moderately so, 5 to 10 inches in diameter, either branching from the base or clear of limbs for approximately 6 feet. Bark pale to dark chocolate brown, with numerous shallow ridges and small lenticels; yields a small quantity of sweet, brown resin when incised.—Common in the lowland; in humid loam in old clearings or along banks of streams (alt. 400–500 ft.); the species has a wide distribution in northern South America and has been reported previously from the state of Ceará, Brazil, and British Guiana. Timber is used mostly for fuel.

Sapwood oatmeal-colored or pale brown and fairly lustrous; heartwood light or dark brown, thin. Wood has no characteristic taste or odor; straight- or roey-grained; fine- or medium-textured; light in weight, but firm; easy to work, takes a smooth finish; does not appear to be durable. Growth rings sometimes visible owing to difference in depth of color. Parenchyma indistinct. Pores numerous, uniformly scattered or with a tendency to crowding; in radial multiples or rows of 2–4, less often solitary; open. Vessel lines fine and short; frequently filled with lustrous tyloses. Rays not distinguishable without lens on cross section; faintly discernible to unaided eye on tangential; darker than adjacent elements and fairly distinct on radial surface; heterogeneous.

Loreto: lower Itaya, *15, 176;* lower Nanay, *609;* near Iquitos, *1494, 1500, 3670;* upper Itaya, *3307.*

Endlicheria Williamsii O. C. Schmidt, Repert. Sp. Nov. 31: 177. 1933. *Isma-moena, Moena blanca, Pampa-moena.*

Tree, 25 to 70 feet tall. Crown wide-spreading. Trunk cylindrical, usually slightly inclined, up to 25 inches in diameter, free of branches up to half the entire height, and with small to medium-sized buttresses. Bark up to 1 inch thick, dark brown, fairly smooth; that of young trees and branches with long, shallow ridges;

secretes a small quantity of sweet, translucent sap when cut. Flowers small, yellowish. Fruit ovoid, with adhering, red calyx.—Common in the lowland, especially in the upper Nanay (alt. 500 ft.); in dense forest in humid loam or adjacent to streams. Timber is sometimes employed for canoes, crating, and furniture.

Sapwood grayish white or pale yellowish brown, well defined; heartwood dull brown. Fresh wood has a strong, spicy odor. Timber not as heavy as *E. anomala* and brittle; saws slightly woolly; checks in drying. Pores of medium size; mostly solitary or in small radial multiples. Rays slightly more pronounced on cross section than in the preceding species.

Loreto: upper Nanay, *1002, 1003, 1004, 1193, 1203.*

5. HUFELANDIA Nees

Hufelandia sp.(?) *Ushun moena.* Tree, ranging up to 80 feet tall. Crown round to moderately so. Trunk straight, columnar, 17 inches in diameter, with low buttresses, and free of branches up to three-fourths the height. Bark yellowish or violet to reddish brown, about 0.5 inch thick, rough, and exudes a small quantity of viscid, translucent resin when cut. Fruit ovoid, bluish black when ripe; January.—Fairly common; in moderately dense growth (alt. 3,200 ft.). Timber is used for house construction.

Sapwood not distinctly demarcated, pale brown or grayish with dark streaks caused by sapstain; heartwood dull brown. Wood tasteless and odorless; straight-grained; medium- or rather coarse-textured; light in weight and fairly soft; easy to cut, takes a smooth finish, holds its place well; not durable. Growth rings faintly visible owing to arrangement of elements and slight variation in depth of color. Parenchyma indistinct; in widely spaced terminal lines. Pores at limit of vision; fairly numerous, well scattered or at times with a tendency to group in concentric zones; solitary or in radial multiples of 2–3, infrequently in small clusters; mostly open. Vessel lines short or long, readily distinguishable to the unaided eye on account of the dark brown gum and calcium deposits present. Rays indistinct or faintly discernible without lens on cross and tangential sections; darker than adjacent elements and fairly distinct on radial surface; small globules of brown gum abundant in the cells on radial section.

San Martín: San Roque, *7077.*

6. NECTANDRA Roland

Trees or shrubs, with more or less leathery leaves. Flowers small, in axillary or terminal, panicled cymes.

Sapwood light-colored, varying from yellowish to light brown, often with a grayish or pinkish gray hue; heartwood pale to dark brown. Wood usually has a faintly spicy odor when fresh; medium-textured; of light to medium weight; fibrous, easy to work, takes a smooth, fairly lustrous or highly lustrous polish; moderately durable. Parenchyma paratracheal; indistinct. Pores of medium size; moderately numerous and well distributed; solitary, less frequently in multiples, seldom in clusters; open. Rays fine and curving at point of contact with rays on cross section; occasionally barely discernible on tangential; often darker than background and producing a silver grain on radial surface.

Vessel perforations simple; intervascular pits elongated and bordered; vessel-ray pits large, simple to half-bordered. Rays heterogeneous, with a tendency to homogeneous; mostly 2–3 cells wide and few to about 40 cells high; cells coarse, often short, the marginal ones larger and sometimes upright.

Nectandra acutifolia (Pavón) Mez, Jahrb. Bot. Gart. Berlin 5: 409. 1889. *Moena amarilla.*

Forest tree, about 80 feet in height. Crown spreading. Trunk erect, columnar, 9 to 14 inches in diameter, clear of limbs up to 28 feet, and with 1 or 2 small buttresses. Bark dark purplish brown and fairly smooth. Flowers small, white, and slightly fragrant. —Fairly common; in flood-free areas (alt. 380 ft.). Timber is used for fuel.

Sapwood lustrous light brown; heartwood dark chocolate brown, thin. Wood when fresh has a spicy odor, but absent or not distinctive in dried material; straight- or roey-grained; medium-textured; of medium weight and strong; easy to cut, splits easily, saws slightly woolly, takes a smooth polish; fairly durable. Growth rings present owing to variation in depth of color. Pores not numerous, well scattered; solitary or less frequently in radial multiples of 2–4, seldom tangentially disposed; open. Vessel lines readily distinguishable against the lighter background. Rays visible with lens on cross and tangential sections; indistinct or discernible without lens on radial surface.

Loreto: Caballo-cocha, *2088;* reported also from the Department of Huánuco.

Nectandra globosa (Aubl.) Mez, Jahrb. Bot. Gart. Berlin 5: 415. 1889. *Moena amarilla, Moena blanca.*

Tree, 50 to 90 feet tall. Crown round or spreading, dense. Trunk straight, round or moderately so, 9 to 16 inches in diameter, free of branches for half to three-fourths the entire height, and occasionally with narrow buttresses up to 5 or 6 feet high. Bark dark pinkish or purplish brown, fairly smooth or with small excrescences. Flowers small, white, rather showy, and fragrant; June–July.—Common in the lower Peruvian Amazon region; in dense forest, often near streams (alt. 380 ft.); reported also from the upland (alt. 4,000 ft.). Wood used to a limited extent for general construction, but mostly for fuel.

Sapwood well demarcated, yellow when fresh, turning to light brown with a grayish tinge on exposure. Wood when freshly cut very fragrant, but odor not perceptible in dried material; straight- or roey-grained; medium- or rather coarse-textured; of light or medium weight; splinters readily, easy to cut, takes a smooth, lustrous polish; liable to check in drying; does not appear to be durable.

Loreto: Caballo-cocha, *2268;* La Victoria, *2863;* Leticia, Peruvian-Brazilian border, *3045.*

Nectandra maranonensis O. C. Schmidt, Notizbl. Bot. Gart. Berlin 10: 229. 1928. *Moena amarilla.*

Tree, 45 to 80 feet in height. Crown spreading. Trunk fairly straight, appressed, 15 inches or more in diameter, branching a few feet above the base or clear of limbs up to half the entire height, and with buttresses about 4 feet high. Bark dark brown or almost black, fairly smooth. Flowers small, white; June–July.—Fairly common in the lower Peruvian Amazon region; in dense forest near lagoons or streams (alt. 380 ft.). Timber is utilized for fuel only.

Sapwood distinctly defined, yellow when fresh, turning to light brown on exposure and often with a grayish tinge; heartwood dark chocolate brown. Wood when fresh slightly fragrant, but odor not distinctive in dried material; straight- or roey-grained; medium-textured; of light or medium weight; splinters easily, takes a smooth polish with a fairly high luster, and holds its place well when finished. Rays fine, sometimes barely visible without lens on cross section; producing a distinctive figure against the lighter-colored background on radial surface.

Loreto: Caballo-cocha, *2447;* La Victoria, *2858.*

Nectandra Pichurim (HBK.) Mez, Jahrb. Bot. Gart. Berlin 5: 449. 1889. *Muina, Pishco-ñahui-muina.*

Tree, up to 60 feet in height. Crown round or spreading. Trunk straight, cylindrical, 12 inches or more in diameter, and free of branches up to 40 feet. Bark light gray or dark purplish brown, moderately smooth. Flowers with creamy white petals and fragrant; February–March. Fruit globose.—Nowhere common, but widely distributed; in dense forest (alt. 380–3,500 ft.). The timber is employed in the highland for doors and door frames and in the lowland mostly for kindling.

Sapwood fairly well demarcated, pale cream-colored or light brown, occasionally with pale grayish or pinkish areas; heartwood light or dark brown with a grayish cast, thin. Wood slightly fragrant, but tasteless; straight- or roey-grained; medium-textured; of medium weight; easy to cut, takes a smooth polish, holds its place well; fairly durable. Growth rings absent or barely visible. Pores faintly visible without lens.

Loreto: Pebas, *1705.*—San Martín: San Roque, *7730.*

Nectandra pulverulenta Nees, Syst. Laur. 283. 1836. *Moena amarilla, Moena blanca.*

Medium-sized forest tree, 45 to 60 feet in height. Crown dense, round or spreading. Trunk straight or moderately so, round, 9 to 15 inches in diameter, either branching a few feet above the base or undivided up to half the entire height, and with buttresses about 2 feet high. Bark grayish white, moderately smooth; inner bark purplish brown. Flowers pale brown or white. October–November. Fruit ovoid, speckled.—Fairly common in the lower Huallaga (alt. 600 ft.); in flood-free areas. Timber is used to a limited extent for door frames and general carpentry.

Sapwood yellowish brown when fresh, becoming pale brown on exposure; heartwood dark brown and perishable. Wood has a faintly fragrant odor; straight-grained; medium- or rather coarse-textured; of light or medium weight; easy to cut, takes a smooth and highly lustrous finish; checks in drying.

Loreto: near Yurimaguas, *3814, 4015, 4913.*

7. OCOTEA Aubl.

Trees or shrubs with leathery leaves. Flowers whitish, in axillary or subterminal panicles. Fruit at first included in the thickened perianth tube, later exserted.

Sapwood grayish white or pale brown; heartwood light to dark purplish brown. Wood of some species has a spicy odor, suggesting turpentine; of medium texture; light and soft to heavy, hard, and compact; sometimes fibrous, but takes a highly lustrous polish. Parenchyma paratracheal, infrequently aliform; often indistinct. Pores of medium size; fairly numerous, well distributed; solitary, less frequently in multiples; open. Rays fairly fine on cross section; occasionally barely distinguishable to unaided eye on tangential; distinct on radial surface.

Vessel perforations exclusively simple; intervascular pits moderately large or very large and in scalariform arrangement. Rays heterogeneous, showing tendency to homogeneous; mostly biseriate, seldom triseriate.

Ocotea cuprea (Meisn.) Mez, Jahrb. Bot. Gart. Berlin 5: 299. 1889.

Uncommon tree, about 55 feet tall. Crown spreading. Trunk erect, cylindrical, about 12 inches in diameter, and clear of limbs up to 36 feet. Bark purplish brown; inner bark separates into coarse, bristly fibers. Flowers fragrant and with pale yellowish white corolla; June–July.—In dry loam in old clearings and thickets (alt. 400 ft.). Timber used by the Yahua Indians of Pebas for the construction of huts.

Wood creamy yellow with dark purplish or almost black streaks; straight-grained; medium- or rather coarse-textured; of medium weight; easy to cut and takes a smooth polish with a moderate luster; fairly durable. Pores appear as small pinpoints; fairly numerous, well scattered; solitary, infrequently in small radial multiples; open. Pith yellowish or dull brown.

Loreto: Pebas, *1884*.

Ocotea grandifolia (Nees) Mez, Jahrb. Bot. Gart. Berlin 5: 290. 1889. *Moena blanca, Sipra-moena.*

Tall shrub, at times attaining the size of a small tree, about 28 feet high. Crown spreading. Trunk straight, round, slender, and free of limbs up to 10 feet. Bark dark purplish or chocolate brown, with few long, coarse ridges, at times united by cross ridges, which appear to be characteristic of this species. Flowers with creamy white corolla. Fruit light green.—Fairly abundant in the lower Huallaga (alt. 500 ft.); in forest flanking the Paranapura, also among low trees and shrubs on the plain of Tarapoto (alt. 1,500 ft.). Timber used for fuel only.

Sapwood lustrous pale yellow, darkening slightly to pinkish brown on exposure; heartwood brown, thin. Wood tasteless, has a slightly fragrant odor; straight-grained; medium-textured; of medium weight to rather heavy, compact, and strong; easy to cut, takes a smooth polish; likely to check in drying; fairly durable. Growth rings present owing to slight variation in depth of color. Pores small and invisible to unaided eye; fairly numerous, well distributed; solitary or in radial multiples of 2–4, infrequently in small clusters; open. Vessel lines short, fine, and barely discernible when held to proper light; tyloses frequently present. Rays fine and irregularly spaced on cross section; faintly distinguishable without lens on cross and tangential sections. Pith yellowish brown, star-shaped.

Loreto: lower Huallaga, *4609;* near Yurimaguas, *7833.*—San Martín: Tarapoto, *6618.*

Ocotea laxiflora (Meisn.) Mez, Jahrb. Bot. Gart. Berlin 5: 371. 1889. *Canela-moena.*

Tree, 25 feet tall, but said to attain a height of up to 90 feet. Crown spreading. Trunk straight, moderately round, slender, and branching a few feet above the base. Bark pinkish to dark chocolate brown, with short and fairly coarse ridges. Fruit round; October–November.—Not common; in sandy loam along edge of dense forest (alt. 550 ft.). Timber is esteemed for furniture and sometimes for canoes.

Wood lustrous yellowish or pale brown; odorless and tasteless; straight-grained; medium-textured; of light or medium weight; splinters easily, takes a smooth finish, and holds its place well. Growth rings present. Pores rather numerous and uniformly scattered; solitary or in radial multiples of 2; open. Pith light brown, star-shaped.

Loreto: Yurimaguas, *4004.*

Ocotea licanioides A. C. Smith, Bull. Torrey Club 58: 107. 1931. *Moena negra.*

Small tree, about 25 feet tall, but said to attain greater height. Branches elongated and drooping. Trunk straight, cylindrical, slender, and free of branches up to three-fourths the entire height. Bark dark purplish brown or almost black and fairly smooth. Flowers creamy yellow. Fruit ovoid, brown when ripe; April–May.—In dense forest (alt. 450 ft.). Timber used to a small extent for the construction of huts.

Wood lustrous yellowish brown and darkening on exposure to air; straight-grained; medium-textured; takes a smooth finish; durable. Growth rings present. Parenchyma paratracheal and sometimes visible with lens as fine, unevenly spaced, concentric lines. Pores small; not numerous, well distributed; mostly solitary. Vessel lines fine and barely visible when held to proper light; lustrous deposits frequently present. Rays fine and distinguishable with lens on cross surface; indistinct on tangential; visible to unaided eye on moistened radial surface. Pith light brown.

Loreto: upper Nanay, *1118*.

Ocotea maynensis (Meisn.) Mez, Jahrb. Bot. Gart. Berlin 5: 359. 1889. *Moena.*

Shrub, about 13 feet tall. Trunk slender and branching from near the base. Bark dark chocolate brown and fairly smooth. Flowers with bright red calyx and yellowish white corolla; September–October. Fruit light green.—Uncommon; in thickets or along margin of forest (alt. 600 ft.).

Sapwood distinctly demarcated, lustrous pale brown; heartwood dark brown. Wood straight-grained; medium-textured; light in weight, but firm; easy to cut.

Loreto: lower Huallaga, *4043*.

Ocotea minutiflora O. C. Schmidt, Notizbl. Bot. Gart. Berlin 10: 231. 1928. *Urcu-moena.*

Tree, 19 to 25 feet tall. Crown spreading. Trunk straight or fairly straight, round, 8 inches in diameter, and undivided for 3 or 6 feet. Bark pinkish or dark purplish brown, with minute excrescences. Flowers red; July–August. Fruit small, ovoid, green; January–February.—Limited in its distribution; in dry, medium loam on edge of path in forest (alt. 1,600 ft.). Timber is used for fuel only.

Sapwood distinctly demarcated, lustrous golden yellow, turning to dull pale brown on exposure to air; heartwood chocolate brown. Wood has a fragrant odor, but is tasteless; straight-grained; medium-textured; of medium weight to fairly heavy and compact; not difficult to work, takes a smooth finish, and holds its place well. Growth rings present. Pores barely visible without lens; mostly in small radial multiples; open. Vessel lines readily visible, but not conspicuous. Rays distinguishable with lens on cross and tangential surfaces; visible without lens against the lighter background on radial surface.

Loreto: near Iquitos, *3667*.—San Martín: Juan Guerra, middle Huallaga, *6844*(?).

Ocotea opifera Mart. in Reise Bras. 3: 1128. 1831. *Moena blanca.*

Tree, up to 70 feet in height. Crown open or moderately flat. Trunk straight, round, 17 to 25 inches in diameter, and clear of branches for one-third the entire height. Bark pinkish to dark brown with coarse excrescences.—Not common; in sandy loam along hill slopes (alt. 500 ft.). Timber used to a small extent for flooring and house construction.

Sapwood distinctly demarcated, lustrous white with a pale pinkish tinge when held to proper light, and turning to a dull oatmeal color after long exposure; heartwood dark brown. Wood straight-grained; medium-textured; fairly light in weight but firm; easy to cut, takes a smooth polish; likely to check in drying.

Loreto: lower Nanay, *642*.

Ocotea rubrinervis Mez, Jahrb. Bot. Gart. Berlin 5: 351. 1889. *Moena blanca, Yurac-moena.*

Tree, about 25 feet tall. Crown flat. Trunk straight, cylindrical, slender, and unbranched for about 4 feet. Bark yellowish brown, smooth; inner bark dark chocolate brown.—Uncommon; in sandy loam among low trees and shrubs of second growth (alt. 1,500 ft.). Timber used to some extent for general carpentry and kindling.

Sapwood well defined, uniform yellowish brown; heartwood thin, dark brown. Wood odorless, has a slightly bitter taste; straight-grained; medium-textured; takes a smooth polish, with a golden luster when held to proper light, and holds its place well when finished. Growth rings present. Rays visible, but not conspicuous, to unaided eye on all surfaces.

San Martín: Tarapoto, *6102*.

Ocotea tarapotana (Meisn.) Mez, Jahrb. Bot. Gart. Berlin 5: 304. 1889. *Moena-aguaras, Canela moena, Turpentina moena.*

Forest tree, in the lowland up to 100 feet in height, whereas in the upland it seldom exceeds 40 feet tall. Crown spreading. Trunk straight, columnar or moderately so, 5 to 20 inches or more in diameter, and undivided up to two-thirds the entire height. Bark about 1 inch thick, dark reddish brown, scaly. Flowers small, pale yellowish or white.—In areas subject to seasonal inundations (alt. 400–1,500 ft.). The dense, durable wood is greatly esteemed for flooring, door frames, and house posts.

Sapwood thin and well demarcated, pale brown; heartwood dark brown. Wood has a strong and distinctive odor suggesting turpentine, whence the local name "turpentia moena"; heavy, moderately hard, and strong; straight- or wavy-grained; medium-textured; requires a sharp plane to work, inclined to be splintery, but takes a lustrous finish and holds its place well; durable. Growth rings absent or poorly defined. Pores of medium size and barely visible; solitary or less frequently in radial multiples of 2 or 3; open or closed. Vessels often filled with white deposit. Rays fine; distinguishable only with lens on all surfaces.

Loreto: upper Nanay, *905*.—San Martín: Tarapoto, *5866*.

Ocotea Tessmannii O. C. Schmidt, Notizbl. Bot. Gart. Berlin 10: 233. 1928. *Moena.*

Tree, 20 to 30 feet tall. Crown spreading or flat; branches arranged in whorls at regular intervals. Trunk erect, cylindrical, slender, and clear of branches for 9 or 10 feet. Bark thin, purplish or chocolate brown, and moderately smooth.—Not common; in forest in dry heavy loam (alt. 600–1,500 ft.). Timber is employed for fuel only.

Wood oatmeal-colored and highly lustrous; odorless and tasteless; straight-grained; medium- or rather coarse-textured; light and fairly soft, but strong for its weight; saws woolly, easy to cut, splinters easily, and takes a smooth finish; not durable. Pith light brown, star-shaped.

Loreto: Yurimaguas, *4728*.—San Martín: Tarapoto, *6594*.

Ocotea Trianae Rusby, Bull. N. Y. Bot. Gard. 6: 506. 1910. *Moena blanca, Pampa moena.*

Medium-sized tree, from 45 to 65 feet tall. Crown spreading or at times almost conical. Trunk straight, round, 11 to 16 inches in diameter, and clear of limbs up to 10 feet. Bark deep pink or purplish brown and moderately smooth.—Fairly common in the lowland (alt. 400 ft.); along margin of forest and especially near streams and lagoons; reported also from the region of the Río Chiarra, Bolivia (alt. 4,000 ft.). Timber is esteemed locally for furniture, house posts, and canoes.

Sapwood almost white or pale brown, occasionally with yellowish areas; heartwood dark brown and perishable. Wood has no distinctive odor or taste; straight-grained; medium- or rather coarse-textured; of medium weight to fairly heavy, firm, and strong;

requires a sharp knife to cut smoothly across grain, not difficult to work, takes a lustrous finish, and holds its place fairly well. Growth rings indistinct or visible owing to variation in depth of color. Vessels often filled with brown or almost black deposit and tyloses sometimes present. Pith pale pinkish brown, narrow.

Loreto: Caballo-cocha, *2153;* near Iquitos, *7947, 8083.*

8. PERSEA Gaertn. f.

Persea americana Mill. Gard. Dict. ed. 8. 1768. *Avocado, Huira-palto, Palto.*

This is one of the common fruit trees cultivated in the lowland, and in places apparently growing spontaneously. It is an attractive tree, up to 30 or 40 feet in height. Crown round or irregular. Trunk straight, columnar, 10 to 18 inches in diameter, and clear of branches for about a third of the entire height. Bark yellowish to purplish brown, rough. Young leaves pubescent. Flowers panicled, yellowish green or white. Fruit pear-shaped, smooth, light green in color, and resembles the West Indian variety; the pulp has a pleasant flavor and the large seeds furnish a dark brown, indelible dye which is employed for marking linen; fruiting in April–June. Wood is seldom used locally.

Wood variable in color from grayish white to yellowish or pale brown, often with dark brown or black streaks caused probably by stain; has no distinctive odor or taste; moderately light in weight, but firm; straight- or moderately straight-grained; medium- or rather coarse-textured; requires a sharp knife to cut smoothly across grain, takes a fairly lustrous finish; does not appear to be durable. Growth rings absent or present; visible owing to variation in depth of color. Parenchyma surrounding the pores; not distinct. Pores faintly discernible to unaided eye; fairly numerous, uniformly scattered; solitary, infrequently in radial or tangential multiples or rows of 2; open. Vessel lines fairly fine, of darker color than background; calcium deposit frequently present. Rays fairly fine; visible with lens on cross and tangential sections; of slightly darker color than the surrounding elements and sometimes distinct on radial surface; heterogeneous; uni- or biseriate.

Loreto: lower Nanay, *324, 325.*

9. PHOEBE Nees

Phoebe pichisensis A. C. Smith, Bull. Torrey Club 58: 103. 1931. *Pishco-moena.*

Tree, approximately 45 feet in height. Crown moderately round. Trunk straight, round, 9 to 15 inches in diameter, and unbranched for 21 feet. Bark very thin, reddish brown, and smooth. Flowers small, pale yellow, in axillary panicles; January–February. —Uncommon; in dense forest not subject to periodical inundations (alt. 3,500 ft.). Timber is esteemed for house construction.

Sapwood distinctly demarcated, almost white when fresh, with a light brown tinge when dried; heartwood reddish brown. Wood fragrant when fresh, but odor and taste absent in dried material; light and fairly soft; straight-grained; medium-textured; requires a sharp knife to cut smoothly across grain, saws slightly woolly, capable of taking a smooth finish; is strong for its weight. Growth rings present. Parenchyma paratracheal; indistinct. Pores small; fairly numerous, uniformly distributed; solitary or less frequently in radial rows of 2–3; open. Vessel lines appear as very fine, short scratches of slightly darker color than adjacent elements. Rays fine and visible with lens on cross and tangential surfaces; indistinct on radial.

Vessels with simple perforations; intervascular pits mostly very large and simple. Rays heterogeneous or nearly homogeneous; uni- or biseriate, infrequently triseriate. Wood fibers sometimes in definite radial arrangement, moderately thick-walled, and with simple pits.

San Martín: San Roque, *7085*.

10. **PLEUROTHYRIUM** Nees

Small or large trees, fairly common in the lower Peruvian Amazon region. Sapwood oatmeal-colored or pale yellow to copper; heartwood very dark brown. Wood sometimes slightly fragrant; fine- to medium-textured; light, but firm, to medium in weight; often saws woolly and takes a fairly or highly lustrous finish; not very durable. Parenchyma paratracheal; indistinct. Pores fairly small or of medium size; few and irregularly scattered; solitary or infrequently in small multiples; open. Rays fine or moderately fine on cross section; indistinct on tangential; often distinct on radial surface.

Pleurothyrium densiflorum A. C. Smith, Bull. Torrey Club 58: 109. 1931.

Tree, approximately 60 feet in height. Crown flat. Trunk bifurcating from the base (diameter of larger limb 11 inches), and with large surface roots. Bark reddish or chocolate brown with a grayish tinge and numerous, fairly coarse lenticels; wood beneath bark

also chocolate brown. Flowers small, greenish white; June–July. —Uncommon; in slightly humid loam near lagoon among shrubs and medium-sized trees (alt. 400 ft.).

Wood creamy yellow and occasionally with slightly darker brown streaks or light gray patches, and with no sharp distinction between sap and heart; has a faintly pleasant odor, but no distinctive taste; fairly light, but firm and strong; straight- or moderately straight-grained; medium-textured; lustrous when freshly cut, easy to work, does not take a very smooth finish; checks and liable to stain slightly in drying. Growth rings absent. Pores barely at limit of vision; numerous and well distributed; solitary or less frequently in radial multiples of 2–3; open. Vessel lines short or fairly long, rather fine, slightly darker than background, and at limit of vision; lustrous tyloses common in vessels. Rays moderately fine, fairly numerous; visible with lens on cross and tangential sections; slightly darker than the surrounding elements and discernible to unaided eye in proper light on radial surface.

Loreto: Caballo-cocha, *2273*.

Pleurothyrium Williamsii O. C. Schmidt, Repert. Sp. Nov. 31: 189. 1933.

Tree, approximately 90 feet in height. Crown open or flat and with few branches. Trunk moderately straight, round, about 17 inches in diameter, and free of branches for 65 feet. Bark greenish or reddish brown, scaly; inner bark fibrous.—Fairly common in the lowland; in flood-free forest (alt. 380 ft.). Timber is used to a small extent for the construction of huts.

Wood deep lustrous yellow, turning on exposure to yellowish brown, and not sharply demarcated into sap and heart; slightly fragrant, but without distinctive taste; straight-grained; medium-textured; moderately heavy and rather tenacious; rather fibrous, not difficult to work, holds its place well; probably durable. Growth rings present, but not distinct; indicated by variation in abundance of elements. Parenchyma paratracheal, in fine terminal lines, and in indistinct, broad, concentric bands. Pores of medium size and sometimes at limit of vision; not numerous and well scattered; solitary or in radial multiples of 2–3, infrequently diagonally disposed; open. Vessel lines appear as fine scratches of darker color than background. Rays fine, wavy, and discernible with lens on cross section; faintly distinguishable to unaided eye on moistened tangential; of darker color and visible without lens, but not conspicuous, on radial surface.

Loreto: Pebas, *1766*.

CAPPARIDACEAE. Caper Family

Herbs, shrubs, or small trees. Leaves alternate, simple or compound, with or without stipules. Flowers axillary or in racemes or corymbs; stamens elongate, few or many. Fruit a berry or capsule.

Woods whitish or yellowish, often with pinkish or reddish brown streaks; heartwood sometimes well defined, reddish brown; variable from light and rather soft to heavy and compact; fine- or medium-textured; easy to work; perishable or durable. Parenchyma paratracheal and in fine, broken, tangential lines, confluent, or in concentric bands which are sometimes conspicuous and appear to indicate limit of growth rings. Pores small or medium-sized; fairly numerous or numerous; solitary or in small radial multiples, occasionally in radial rows; open or closed. Rays fine or fairly broad; sometimes visible without lens on tangential and radial surfaces.

Vessels have simple perforations; vessel-parenchyma pits half-bordered. Rays homogeneous or with a tendency to heterogeneous; 1–3 cells wide and few cells high. Wood fibers have simple or indistinctly bordered pits.

1. CAPPARIS L.

Small trees or shrubs, glabrous or variously pubescent. Leaves alternate, simple, stalked, and often leathery. Flowers small or large, with white petals and numerous stamens. Fruit variable as to form, but technically a berry. The members of this genus are common in low forest and especially in arid areas.

Wood light-colored, whitish or yellowish, often with pinkish or reddish streaks and blue stain; heartwood sometimes well defined, reddish brown; sometimes with a slightly fetid odor; variable in weight from light to heavy; fine- or medium-textured; perishable or durable. Parenchyma paratracheal and in fine, broken, tangential lines, also in closely or widely spaced concentric bands; often conspicuous. Pores small to medium-sized; fairly numerous to numerous; in multiples of 2–5, less often solitary or in small clusters; open or filled with yellowish or dark gum. Rays fine or barely visible; sometimes distinguishable on tangential; distinct in some specimens on radial.

Capparis nitida Ruiz & Pavón in DC. Prodr. 1: 252. 1824. *Intuto-caspi.*

Medium-sized, slender tree, 35 to 55 feet tall. Crown spreading. Trunk straight or moderately straight, cylindrical, 8 inches in diam-

eter, and either branching from near the base or clear of limbs for upwards of 21 feet. Bark greenish or light grayish to dark brown, fairly smooth or with low ridges. Leaf blades entire, ovate, rounded at base, acuminate at apex, lustrous above, glabrous, subcoriaceous, petiolate. Flowers white and somewhat large. Fruit globular, dark or almost black; January–February.—Common in rocky land or among shrubs and low trees of second growth, also along banks of streams (alt. 500–1,500 ft.).

Wood pale yellowish brown or almost white, with extensive grayish areas and no distinct demarcation between sap and heart; has no particular odor or taste; straight- or interlocked-grained; fine- or medium-textured; of medium weight, tough, and strong; fairly easy to cut, takes a moderately smooth finish; does not appear to be durable. Growth rings present, but not distinct, owing to variation in color and abundance of elements. Pores not numerous; either solitary or in radial rows of 2–5, sometimes in diagonal pairs. Rays not as prominent as in *C. Schunkei.*

Loreto: lower Huallaga, *4683.*—San Martín: Tarapoto, *5567, 5725.*

Capparis petiolaris HBK. Nov. Gen. & Sp. 5: 91. 1821. *Ninacaspi, Mango-micunan.*

Tree, 25 to 30 feet tall. Crown spreading. Trunk straight or moderately straight, columnar, 8 to 12 inches in diameter and clear of branches for about 7 feet. Bark greenish to pale or dark brown, almost black, astringent, and is reputed to possess medicinal properties. Leaves long-petiolate, oblong or oblong-ovate, membranaceous, rounded or abruptly acute at apex, obtuse to round at base, glabrous. Inflorescence in terminal racemes; flowers white, rather large, and conspicuous. Fruit light brown, torrulose, oblong-obovate, indehiscent.—In dense forest around the estuary of the Mayo River, also in second growth on the plain of Tarapoto (alt. 1,400–1,800 ft.). Wood is used to a limited extent for general carpentry and fuel.

Sapwood pale yellowish brown or white, often with dark veining; heartwood thin, pale brown. Wood odorless and tasteless; straight- or interlocked-grained; uniformly fine-textured; moderately heavy, hard, and tenacious; easy to cut, takes a smooth finish; liable to check and stain in drying. Growth rings present owing to arrangement of parenchyma. Parenchyma readily visible in some specimens. Pores numerous, well distributed; solitary or in radial

multiples; open or closed. Rays barely visible with lens on cross section; indistinct on tangential; of same color as background, but discernible, on radial surface.

San Martín: Mayo River, *6281;* Rumisapa, *6786;* Juan Guerra, *6889, 6903.*

Capparis Quina Macbr. Candollea 5: 357. 1934. *Quina-quina.*

Forest tree of the upland, about 35 feet tall. Crown spreading. Trunk erect, somewhat compressed, 7 to 12 inches in diameter, and free of limbs for about 6 feet. Twigs rather compressed. Leaves elliptic, rounded at base, slightly emarginate at apex. Calyx lobes round and petals round-obovate. Fruit grayish green.

Wood pale yellowish brown with grayish or dark streaks; straight-grained; medium-textured; moderately heavy, strong, and tough; takes a fairly smooth, lustrous finish.

San Martín: Cumbasa, near Tarapoto, *5753.*

Capparis Schunkei Macbr. Field Mus. Bot. 4: 170. 1929.

Tree, 30 to 35 feet in height. Crown spreading. Trunk straight, cylindrical, 7 to 10 inches or more in diameter, and clear of limbs up to 10 feet or branching from base. Twigs glabrous. Leaves submembranaceous or coriaceous, elliptic or oblong-elliptic, abruptly acuminate at apex, subcuneate at base, petiolate, glabrous above. Inflorescence stellate-pubescent; flowers pale greenish or grayish yellow. Fruit light brown, globular or pear-shaped.

Wood white to pale yellowish with a gray cast and dark veining, and darkening slightly on exposure to air; tasteless, but has a slightly pungent odor; straight-grained or fairly so; medium- or coarse-textured; moderately heavy, tough, and firm; works easily, holds its place well, and takes a smooth finish with a moderate luster; fairly durable.

Loreto: lower Huallaga, *4118, 4820.*—San Martín: Tarapoto, *6692.*

Capparis tarapotensis Eichl. in Mart. Fl. Bras. 13, pt. 1: 284. 1865.

Shrub, 10 to 15 feet tall. Leaves ovate, coriaceous, obtuse or rounded at apex, acute or rounded at base, and with short, stout petiole. Flowers yellowish. Fruit dark reddish brown and up to 5 inches long.—In sandy soil in second growth around Tarapoto (alt. 1,300 ft.).

Sapwood fairly clearly demarcated, yellowish with pale violet striping, and fairly lustrous; heartwood dull slaty gray, thin. Wood straight-grained; fine-textured; moderately heavy, strong.

San Martín: Tarapoto, *6654*.

2. CRATAEVA L.

Crataeva Tapia L. Sp. Pl. 444. 1753. *Nina-caspi, Palo de candela, Tamara.*

Small, glabrous tree, up to 30, infrequently 45, feet in height. Crown spreading. Trunk usually bent, moderately round, either branching from base or clear of limbs up to 10 feet, and about 16 inches in diameter. Bark light gray to brown with small excrescences. Leaves long-stalked, the 3 leaflets oblong or elliptic, entire, acute or acuminate, pale beneath. Flowers purplish or greenish, corymbose or racemose. Fruit globose, green or yellow, and has a faint odor suggesting garlic. The roots secrete an acrid, irritating resin.—Common in the lowland; in forest or thickets, often in humid loam or in the vicinity of streams (alt. 400–500 ft.). Timber is used to a small extent for general carpentry.

Wood white or creamy yellow to pale yellowish brown, often with grayish stain streaks; has a rather disagreeable odor when fresh, absent or indistinct in dried material, tasteless; straight- or interlocked-grained; medium-textured; of light or medium weight to moderately heavy, hard, brittle; fairly easy to work; does not appear to be durable. Growth rings fairly distinct in some specimens. Parenchyma paratracheal, sometimes confluent, or in concentric lines limiting growth rings. Pores small to medium-sized and distinct because of parenchyma sheaths; fairly numerous, well scattered or, in some samples, showing a tendency to crowd; solitary or in radial rows of 2–3. Vessel lines short, often readily distinguishable against the lighter-colored background due to dark brown gum present. Rays visible to unaided eye, but not prominent, on cross and radial sections; indistinct on tangential surface; heterogeneous.

Loreto: Río Morona, near Iquitos, *90, 93;* Pebas, *1578;* Caballococha, *2219, 2270, 2411, 2443, 2450;* La Victoria, *2665, 2854, 3122;* Yurimaguas, *4655*.

3. STERIPHOMA Spreng.

Steriphoma peruvianum Spruce in Mart. Fl. Bras. 13, pt. 1: 267. 1865.

Shrub or small, straggly tree, sometimes scandent, seldom more than 15 feet in height. Crown open. Trunk slender and unbranched for 4 or 5 feet. Bark pale brown or very dark brown to almost black, fairly smooth or with few, rather coarse ridges; inner bark pinkish or grayish brown; wood beneath bark pink with a grayish cast. Leaves alternate, glabrous above, and puberulent beneath. Flowers with brown calyx and numerous stamens. Fruit about 12 inches long and tomentose.—Not common; in fairly dense forest, often close to banks of streams (alt. 1,500 ft.).

Wood almost white or pale yellow with pinkish or light gray streaks, and darkening slightly to yellowish brown on exposure; odorless and tasteless; straight-grained; fairly fine-textured; variable in weight from light to rather heavy and fairly tenacious; not difficult to work, takes a smooth, dull finish, and holds its place well; fairly durable although susceptible to stain in drying. Growth rings present owing to slight variation in depth of color. Parenchyma in numerous, irregular, broken, or sometimes continuous, concentric bands; lighter-colored than background and faintly or distinctly discernible to unaided eye. Pores small; not numerous, scattered; in radial multiples of up to 7, less frequently solitary, in diagonal or tangential pairs, or in small clusters. Vessel lines fine, short or long; sometimes filled with black gum. Rays very fine, numerous; distinguishable with lens on cross and radial surfaces; indistinct on tangential.

San Martín: Cumbasa, near Tarapoto, *5647, 5732;* herbarium material collected also at Juan Guerra.

ROSACEAE. Rose Family

Trees or shrubs. Leaves alternate, stalked, entire or nearly so, with small stipules. Flowers small or large and showy, perfect, with or without petals; stamens few or numerous; calyx 5-lobed. Fruit a drupe. The best-known representatives of this family are fruit trees; namely, cherry, peach, plum, almond, and apricot. The tropical species have little superficial resemblance to the temperate plants of the group. The timbers of any local importance in the montaña are those of *Hirtella* and *Licania*, although they are little used because of their poor dimensions.

The woods are of various shades of pale brown, grayish, or reddish, and show little or no distinction between sap and heart; have no distinctive odor or taste; medium- or coarse-textured; of medium weight to heavy, hard, and strong, but not resistant to decay. Parenchyma in numerous, fine, wavy lines, often forming

network with rays and suggesting Lecythidaceae. Pores fairly small to large; rather few and well scattered; solitary, seldom in small multiples or rows; often filled with black gum, calcium deposit, or lustrous tyloses. Rays fine or very fine, numerous, and wavy on cross section; indistinct on tangential; visible, but not distinct, on radial surface.

Vessel perforations mostly simple (in Peruvian genera) to scalariform; vessel-ray pits half-bordered or simple, the latter often elongated and scalariform in arrangement. Rays heterogeneous; uniseriate in *Hirtella*, *Licania*, and *Parinarium*. Wood fibers have numerous, conspicuous, bordered pits.

1. COUEPIA Aubl.

Trees or shrubs. Leaves short-stalked, leathery. Flowers small, paniculate. Fruit often large, 1-seeded. Their timber is esteemed for carpentry, and a reddish brown resin, furnished by the bark, sapwood, and seeds of some species, is used for painting canoe paddles.

Sapwood variegated pale or chocolate brown, often with a grayish tinge, and darkening on exposure to sunlight; heartwood darker brown. Wood sometimes has a pleasant odor when fresh, but no distinctive taste; fairly lustrous; coarse-textured; of medium weight to heavy, strong, and durable; not difficult to work; liable to check in drying. Parenchyma in numerous, wavy, irregularly spaced, broken, tangential or concentric lines, often forming a network with the rays, also diffuse. Pores large; few; solitary; open or filled with black gum or grayish white deposit of calcium. Rays fine, numerous, and often wavy on cross section; indistinct on tangential; fairly distinct or distinct on radial surface; small specks of brown gum common in ray cells.

Couepia canomensis (Mart.) Benth. in Hook. Journ. Bot. 2: 215. 1840.

Small or medium-sized tree of the lowland, seldom more than 45 feet tall. Crown spreading. Trunk straight, cylindrical, 16 inches or more in diameter, and free of limbs for from one-fourth to one-half its height. Bark thin or moderately thick, dark brown or almost black. Leaf blades subcoriaceous, entire, alternate, short-stalked, acute at base, acuminate at apex, glabrous above and tomentose beneath especially along the costa. Flowers small, white or cream-colored, paniculate. Fruit obovate, light brown, velvety.—Attains its best development in open dry loam in rough pastures (alt. 400 ft.). Timber is sometimes used for carpentry.

Wood pinkish to dark brown throughout, with no sharp distinction between sap and heart; odorless and tasteless; straight- or fairly straight-grained; rather coarse-textured; heavy, compact, hard, strong, but brittle and splintery; not easy to work; resistant to insect attacks and durable. Growth rings indistinct or poorly defined. Parenchyma abundantly developed; in numerous, fine, wavy, fairly evenly spaced, concentric lines, anastomosing with the rays. Pores of medium size and visible without lens; few, scattered; solitary, infrequently in radial or tangential multiples of 2; open. Vessel lines appear as short, fine scratches. Rays indistinct or visible on cross and tangential sections; barely at limit of vision on radial surface.

Loreto: near Iquitos, *3780*.

Couepia chrysocalyx (Poepp. & Endl.) Benth. in Mart. Fl. Bras. 14, pt. 2: 42. 1867. *Parinari, Sacha-umari.*

Shrub or small tree, seldom exceeding 12 or 15 feet in height. Crown dense, spreading. Trunk straight, round, and branching from near the base. Bark dark reddish brown, smooth, and yields a thin, insipid, reddish brown sap. Flowers with yellowish white petals and pinkish white staminal filaments; October–November. Fruit large, ovoid, green, and yields a dye employed locally as a substitute for ink.—Fairly common in the lower Huallaga; in dense forest (alt. 500 ft.).

Wood uniform pale brown throughout, darkening slightly on exposure; tasteless, but has a slightly fragrant odor when fresh; straight-grained; medium-textured; moderately heavy and hard; easy to cut, takes a smooth finish; probably durable. Growth rings visible owing to absence of parenchyma. Parenchyma in numerous, fine, wavy, short, tangential lines. Pores of medium size and at limit of vision; few, evenly distributed; solitary or infrequently in radial multiples of 2; mostly open. Vessel lines short, dark, and rather prominent; often filled with dark brown gum. Rays indistinct or distinguishable with lens on cross and tangential surfaces.

Loreto: lower Huallaga, *5012*.

Couepia paraensis Benth. in Hook. Journ. Bot. 2: 216. 1840.

Slender, forest tree of the lowland, about 35 feet tall. Crown conical. Trunk straight, round, clear of branches for 15 feet. Bark up to 0.5 inch thick, light brown, sculptured, and secretes a small amount of reddish brown resin.—Uncommon; aquatic or along banks of streams (alt. 400 ft.). Timber is used locally for general carpentry.

Sapwood not sharply defined, pinkish brown with a grayish tinge, darkening slightly on exposure to air; heartwood slightly darker brown. Wood somewhat harder, heavier, and more compact than that of *C. chrysocalyx.*

Loreto: Iquitos, *1490.*

Couepia racemosa Benth. var. *Machusacha.*

Straggly, slender tree, about 22 feet in height. Crown spreading. Bark pale grayish or dark chocolate brown and yields a small amount of pinkish red resin. Flowers small, white. Fruit ovoid, yellow when mature; seeds imbedded in a white, succulent, and edible pulp. —In humid areas, especially along margin of streams (alt. 500 ft.).

Wood pale pinkish brown; moderately heavy, and hard. Pores of medium size, readily visible; more numerous than in *C. chrysocalyx.*

Loreto: upper Nanay, *1161.*

Couepia speciosa Pilger, Bot. Jahrb. 37: 539. 1906. *Capricornia, Chibo-runtu-caspi.*

Forest tree, up to 70 feet tall. Crown flat. Trunk erect, cylindrical, 10 to 20 inches in diameter, and free of limbs for more than half the height. Bark up to 2 inches thick, pale pinkish brown, scaly; inner bark yellowish brown and fibrous. Leaves light brown beneath. Flowers large, yellowish brown. Fruit ovoid, about 4 inches long, dark brown when mature; May–June.—Nowhere abundant; in areas free from floods (alt. 500 ft.). Timber is esteemed locally for general carpentry and to a limited extent for furniture.

Sapwood uniform pale pinkish brown; heartwood thin, dark brown. Wood hard, heavy, and durable, but liable to check in drying. Vessel lines short and conspicuous on account of dark gum and white deposits occasionally present. Rays not distinct, but more readily visible on radial surface than in *C. chrysocalyx.*

Loreto: upper Nanay, *888.*

Couepia subcordata Benth. in Mart. Fl. Bras. 14, pt. 2: 46. 1867.

Forest tree, up to 90 feet or more in height. Crown flat. Trunk straight, moderately round, 14 to 24 inches in diameter, and free of branches up to 50 feet. Bark light brown, scaly. Flowers yellow; May–June.—Not common; in dense growth near the Peruvian-Brazilian frontier (alt. 380 ft.). Wood is used mostly for fuel.

Sapwood not well defined, pale yellowish or pinkish brown with extensive grayish tinge; heartwood brown. Wood moderately heavy and hard; not easy to work; appears to be durable.

Loreto: La Victoria, *3173*.

Couepia Ulei Pilger, Bot. Jahrb. 40: 142. 1907. *Parinari, Sinchi-parinari.*

Common tree of the lowland forest, up to 40 or 50 feet in height. Crown spreading. Trunk fairly straight, cylindrical, 8 to 14 inches in diameter, and free of branches for 9 to 35 feet. Bark about 0.75 inch thick, grayish, purplish, or dark chocolate brown; inner bark coarsely fibrous; bark and sapwood, when cut, secrete a small amount of reddish brown resin.—In humid loam close to streams, but more often in flood-free areas (alt. 380 ft.). Timber is esteemed for carpentry and fuel.

Sapwood purplish or pale brown with a grayish cast; heartwood dark reddish brown. Wood moderately heavy to heavy, dense, hard, and resilient; easy to work, takes a smooth finish with a moderate luster; appears to be durable, but liable to check in drying.

Loreto: lower Itaya, *63*, *88*.

Couepia Williamsii Macbr. Candollea 5: 366. 1934.

Uncommon tree, up to 20 feet in height. Crown open. Trunk erect, cylindrical, slender. Bark light or dark brown, with small incrustations. Flowers brown. Fruit small, ovoid; June–July. —In flood-free forest (alt. 380 ft.). Wood is employed to a limited extent for fuel.

Sapwood pinkish brown and fairly well demarcated; heartwood brown. Wood heavy, hard, and denser than most *Couepia* species. Rays at limit of vision on radial surface.

Loreto: La Victoria, *2975*.

2. HIRTELLA L.

Small trees or shrubs with abundant pubescence. Leaves simple. Flowers small, but often rather showy, with long-exserted stamens.

Wood pale brown with a grayish tinge and with little or no distinction between sap and heart; odorless and tasteless; straight-grained; fine- to rather coarse-textured; of medium weight to rather heavy; hard, strong, tenacious, and durable; not always easy to work and capable of taking a fairly smooth and lustrous polish. Parenchyma in numerous, fine, often wavy, concentric lines forming

a network pattern with the rays. Pores moderately small to rather large; few; solitary, infrequently in small radial, diagonal, or tangential multiples; often filled with lustrous deposit. Rays fine or very fine, numerous, straight or slightly wavy on cross section; indistinct on tangential; sometimes fairly distinct on radial surface; uniseriate.

Hirtella americana L. Sp. Pl. 34. 1753.

Shrub, 9 to 12 feet tall. Crown dense, open. Trunk erect, round, slender, and branching from near the base. Bark dark brown, with small lenticels. Flowers purplish, in long racemes. Fruit violet black, succulent; June–July.—Of limited distribution, usually in dry loam among shrubs and in clearings (alt. 380 ft.).

Wood pale brown throughout; of medium weight, hard, and compact. Growth rings present owing to variation in abundance of elements. Parenchyma in numerous, fine, concentric lines. Pores small or fairly small; rather few, well scattered; solitary; mostly open. Vessel lines indistinct. Rays invisible without lens on all sections.

Loreto: Caballo-cocha, *2358*.

Hirtella americana var. **hexandra** (Willd.) Hook. in Mart. Fl. Bras. 14, pt. 2: 33. 1867.

Tall shrub or small tree, ranging up to 20 feet in height. Trunk moderately straight, cylindrical, slender, and free of limbs up to 6 feet. Bark pale to violet brown, fairly smooth, and with minute lenticels. Flowers small, pinkish or scarlet; September–October. Fruit small, ovoid.—Common in the lower Huallaga, in dry loam in open patches among tall trees, also in sandy loam among shrubs and low trees on the plain of Tarapoto (alt. 450–1,500 ft.). Timber is employed for fuel, occasionally for house construction.

Wood pale or pinkish brown throughout with a grayish cast; odorless and tasteless; interlocked- or straight-grained; uniformly fine-textured; moderately heavy, hard, tough, and compact; durable. Growth rings occasionally present owing to slight variation in color. Parenchyma in numerous, fine, evenly spaced, concentric lines, forming a network with the rays. Pores of medium size, sometimes at limit of vision; fairly numerous and well scattered; mostly solitary, infrequently in small radial or diagonal multiples or rows; open. Vessel lines short, fine, but distinguishable without lens; lustrous and pale grayish deposits occasionally present. Rays numerous, evenly spaced, and of same thickness as parenchyma

lines on cross section; barely discernible with lens on tangential; slightly darker than adjacent elements on radial surface and cells often filled with minute globules of brown gum.

Loreto: lower Huallaga, *3829, 7832.*

Hirtella americana var. **latifolia** Macbr., ined.

Shrub, about 14 feet in height. Crown dense, spreading. Trunk straight, round, slender, and branching 2 or 3 feet from the base. Bark thin, exfoliating. Flowers violet; June–July.—Not common; in dense forest free from seasonal floods (alt. 380 ft.).

Wood pinkish when freshly cut, turning to pale or pinkish brown on exposure; heavy, compact, and tenacious, but inclined to be splintery. Growth rings absent or indistinct. Pores fairly small or at limit of vision; solitary, also in small radial or tangential multiples. Vessel lines fine and faintly visible without lens when held to proper light; often filled with pale grayish deposits. Rays occasionally distinguishable without lens on radial surface.

Loreto: La Victoria, *2765.*

Hirtella americana var. **oblongifolia** (DC.) Hook. in Mart. Fl. Bras. 14, pt. 2: 34. 1867.

Uncommon shrub, about 9 feet in height. Crown full, open. Trunk bent, compressed, and slender. Bark reddish to dark chocolate brown. In dry medium loam in dense forest (alt. 380 ft.).

Wood pale or reddish brown with a grayish cast; moderately heavy, hard, and compact, but splintery; susceptible to insect attacks. Growth rings faintly distinguishable owing to variation in abundance of parenchyma. Pores mostly small; fairly numerous and well scattered; solitary, less frequently in tangential multiples of 2; open or closed. Brown and grayish deposits common in vessels. Rays finer than parenchyma lines on cross section; slightly darker than background on radial surface.

Loreto: La Victoria, *2990.*

Hirtella pilosissima Mart. & Zucc. Abh. Akad. Muench. 1: 373. 1832. *Yaco-shimbillo.*

Small or medium-sized tree, seldom exceeding 35 feet in height. Crown dense, spreading. Trunk straight, cylindrical, 6 to 10 inches in diameter, and free of branches for approximately one-third the height. Bark up to 0.5 inch thick, greenish or light brown, scaly. Flowers with pinkish or reddish pink corolla; May–June.—Limited

in distribution; usually in humid loam in dense forest (alt. 450 ft.). Timber has no local application.

Wood uniform pale brown with occasional grayish brown streaks; odorless and tasteless; straight- or interlocked-grained; medium-textured; heavy, hard, and strong; rather difficult to work, takes a smooth finish with a moderate luster when held to proper light; liable to check in drying. Growth rings sometimes present owing to variation in abundance and arrangement of elements. Parenchyma in numerous, fine, evenly spaced, concentric lines, forming a network with the rays. Pores barely at limit of vision; fairly numerous, uniformly distributed; mostly solitary, infrequently in tangential multiples of 2; open. Vessel lines short or fairly long and moderately fine, but discernible without lens; pale grayish or reddish brown deposits frequently present. Rays slightly thinner than parenchyma lines and fairly evenly spaced on cross section; indistinct on tangential; slightly darker than adjacent elements on radial surface.

Loreto: upper Nanay, *804*, *1183*.

3. **LICANIA** Aubl.

Small or large trees, glabrous or pubescent, with small or large, simple, short-stalked leaves. Flowers small, paniculate, with minute petals or none. Fruit often very large.

Wood pale or pinkish brown with a grayish tinge, sometimes darkening on exposure, and with long, broad, prominent, dark reddish brown gum streaks; odorless and tasteless; straight-grained; medium- or coarse-textured; heavy, hard, strong, and durable, and should be suitable for heavy construction; easy to split and takes a smooth, fairly lustrous polish. Parenchyma in numerous, slightly wavy, concentric bands, sometimes in irregular, fine lines grouped in concentric bands of 2, 3, or more lines and producing a hoary effect when viewed under lens. Pores of medium size or large; rather few, diffuse- or inclined to ring-porous; predominantly solitary, also in small radial, diagonal, or tangential multiples; open or filled with gum, lustrous tyloses, or calcium deposit. Rays fine, numerous, and closely spaced on cross section; indistinct on tangential; barely visible at times on radial surface; uniseriate.

Licania elata Pilger, ined.

Uncommon tree, up to 95 feet tall. Crown moderately round. Trunk erect, cylindrical, approximately 30 inches in diameter, unbranched for 48 feet, and with buttresses 2 or 3 feet high. Bark 1

inch thick, light gray, and with short, coarse, vertical ridges; inner bark purplish brown, and when cut exudes an abundance of insipid, dark reddish brown resin. Flowers small, pale yellowish white; October–November.—In dense forest free from seasonal inundations (alt. 450 ft.). Timber is employed for fuel only.

Sapwood light brown with darker streaks and turning to darker brown on exposure; heartwood dark reddish brown, susceptible to termite attacks. Wood odorless, but slightly bitter to taste; straight-grained; rather coarse-textured; moderately heavy, firm, and strong; fairly easy to work and takes a smooth finish. Growth rings occasionally present owing to variation in abundance of elements. Parenchyma in numerous, fine lines connecting the rays, also in slightly wavy, concentric bands indicating growth rings. Pores large and readily distinguishable without lens; not numerous, well scattered; solitary or infrequently in small radial, diagonal, or tangential multiples; open or filled with yellowish white deposits. Vessel lines short and conspicuous on account of the grayish white or light brown deposits frequently present. Rays distinguishable only with lens on cross and tangential sections; barely at limit of vision on moistened radial surface.

Loreto: Puerto Arturo, lower Huallaga, *5064*.

Licania octandra O. Ktze. Rev. Gen. 1: 217. 1891.

Small tree, not exceeding 25 feet in height. Crown conical. Trunk straight, round, slender, and branching 2 or 3 feet from the base. Bark very thin, dark grayish brown, and fairly smooth. —Not common; in dry medium loam among low trees and shrubs of second growth (alt. 500 ft.). Wood is employed for fuel.

Wood uniform light brown; interlocked-grained; fine- and uniform-textured; slightly heavier than *L. elata;* fairly easy to work, takes a smooth finish suggesting pearwood (*Prunus*); durable. Growth rings present owing to slight variation in depth of color. Parenchyma in numerous, wavy, closely spaced, concentric lines or bands. Pores rather small and barely at limit of vision. Vessel lines short, fine, and faintly discernible without lens. Rays distinguishable without lens on moistened radial surface only.

Loreto: upper Nanay, *1331*.

4. PARINARIUM Aubl.

Parinarium parile Macbr. Candollea 5: 367. 1934. *Uchpaumari.*

Tree, up to 75 feet in height. Crown spreading. Trunk erect, columnar, from 20 to 24 inches in diameter, clear of branches for

about half the entire height, and with small buttresses. Bark grayish white, yellow, or reddish brown, and scaly; inner bark coarsely fibrous. Flowers pale yellow; May–June. Edible fruit with large seeds.—Limited in its distribution; in humid areas or close to streams in dense forest (alt. 450 ft.). Timber is not used locally.

Sapwood pale pinkish brown and darkening somewhat on exposure; heartwood reddish or purplish brown. Wood has no distinctive odor or taste; straight- or irregular-grained; medium- or rather coarse-textured; of medium weight to heavy, strong, and firm; moderately easy to work, does not take a very smooth finish, inclined to be splintery; likely to check in drying; durable. Growth rings absent or present; visible owing to variation in depth of color. Parenchyma in fairly numerous or numerous, fine or moderately distinct, evenly spaced, wavy, tangential or concentric lines. Pores visible to unaided eye as fine pinpoints; rather few, diffuse- or ring-porous; solitary, seldom in radial multiples of 2–3; mostly open. Vessel lines rather coarse, and readily distinguishable, but not conspicuous, to unaided eye. Rays numerous, finer than parenchyma lines, and visible only with lens on cross section; barely distinguishable to aided eye on tangential and radial surfaces.

Loreto: upper Nanay, *1113*, *1140*.

CONNARACEAE. Connarus Family

Small trees, shrubs, or woody vines. Leaves alternate, odd-pinnate, the leaflets leathery, entire, narrow, and long-pointed. Flowers small, whitish, in racemes or panicles, with 5 petals and 10 or fewer stamens. Fruit a leathery or woody follicle, its solitary seed subtended by a fleshy aril.

1. CONNARUS L.

Small trees, shrubs, or large woody vines. Leaves long-stalked; the leaflets acuminate, glabrous or nearly so. Flowers small, whitish, in panicles. Fruit large, conspicuously stalked, striate-nerved.

Sapwood pinkish brown with a grayish cast; heartwood reddish or dark chocolate brown. Wood medium-textured; moderately heavy; capable of taking a smooth polish; durable. Parenchyma metatracheal; in widely and irregularly spaced concentric lines or bands. Pores of medium size to large; few or fairly numerous, diffuse- or showing a tendency at times to ring-porous; solitary or in multiples of 2–3, seldom in small clusters; open or infrequently

filled with calcium deposit. Rays fine on cross section; indistinct on tangential; sometimes fairly distinct on radial surface.

Vessel perforations exclusively simple; vessel-parenchyma pits simple or bordered. Rays heterogeneous; mostly uni- or biseriate, infrequently triseriate.

Connarus Patrisii (DC.) Planch. Linnaea 23: 432. 1850. *Shitari-caspi.*

Tall shrub or small tree, 15 to 18 feet in height, with wide-spreading branches. Trunk straight, round, slender, and undivided for 7 feet. Bark reddish brown, with small, dark brown or black lenticels. Flowers yellow; December–January. Fruit subround and depressed above.—Of limited distribution; in sandy loam along hill slopes among low trees and shrubs (alt. 1,600 ft.).

Wood pale brown when fresh, turning to deep pinkish or reddish brown on exposure; odorless, but slightly bitter when freshly cut; straight-grained; fairly fine- or medium-textured; rather heavy; not difficult to work, takes a smooth polish; often damaged by insects. Growth rings present, but not well defined. Parenchyma in indistinct, concentric bands or lines, which at times appear to indicate limit of growth rings. Pores fairly small or of medium size; few and well scattered; solitary or less frequently in radial pairs, seldom in small clusters; open or closed. Vessel lines slightly darker than background. Rays numerous, closely spaced, slightly sinuous, and visible only with lens on cross section; slightly darker than adjacent elements and barely distinguishable without lens on moistened radial.

San Martín: Guaypurima, near Tarapoto, *6209, 6641.*

Connarus Sprucei Baker in Mart. Fl. Bras. 14, pt. 2: 187. 1871. *Paujil-sacha, Paujil-singa.*

Shrub, sometimes scandent, 8 to 13 feet in height. Bark reddish brown with rather large lenticels; yields when incised a small amount of brown resin. Twigs glabrous. Leaves trifoliolate; leaflets coriaceous, glabrous on both sides, oblong, acute or acuminate at apex, narrowly rounded at base. Inflorescence in dense terminal or axillary panicles; flowers white, sessile or short-pedunculate, fragrant. Fruit rather appressed-ovoid and red when mature.—Fairly common in the lowland; in thickets or along border of forest in dry loam (alt. 400 ft.).

Wood deep pinkish brown with occasional pale grayish streaks; odorless and tasteless; straight-grained; uniformly fine-textured; takes a smooth, lustrous finish. Growth rings indistinct or poorly

defined. Parenchyma not visible or in very fine, broken, concentric lines. Pores small or moderately large and at limit of vision; have a tendency to ring-porous arrangement; solitary or in small radial multiples. Rays barely visible to aided eye on cross and tangential sections; slightly darker than background on radial.

Loreto: Iquitos, *3664*.

LEGUMINOSAE. Bean Family

This enormous and highly important family consists of about 550 genera and 15,000 species of trees, shrubs, herbs, often vines, frequently armed with spines or prickles. Leaves chiefly alternate, nearly always compound, and provided with stipules. Flowers usually resembling those of the bean or pea, but sometimes almost regular; the 5 petals often very unlike, one of them, the "standard," being larger than the others, the two lateral ones, "wings," narrower, the two lowest, "keel," often still smaller and frequently united; sepals more or less united; stamens commonly 10, sometimes 5 or 9, and occasionally very numerous. The typical fruit is a pod, often resembling a bean pod, but frequently shows great variation in size and form. The family is one of the most important from an economic standpoint. Many of the tropical timbers are among the most valuable for cabinetwork, inlay, carving, and musical instruments, also for purposes requiring strength and durability; other species are sources of food and forage, gums and resins, dyes, drugs, and medicines, and some are cultivated for their fruits, for shading, ornament, or fences.

The woods of this family exhibit almost every conceivable variation. Sapwood is oatmeal-colored, white, or yellowish to various shades of pale brown; heartwood sometimes well defined, variable from pale brown to dark purple or chocolate. In density they range from as light as cork to as heavy as "quebracho" (*Schinopsis*). Very few of the Peruvian species have distinctive odor or taste. Texture varies from fine or moderately fine to very coarse; the grain from straight to irregular. The parenchyma is usually the most characteristic feature of the woods and is developed in abundance around the pores, aliform, also in tangential and concentric lines or bands, often uniting the pores or indicating limit of growth rings. Pores mostly of medium size to large; few and well scattered to numerous and inclined to be crowded; most frequently diffuse-porous; solitary or in multiples, less frequently in rows or clusters; often filled with lustrous tyloses, calcium, or dark gum. Rays vary from exceedingly

fine to broad and distinct on cross section; usually indistinct without lens on tangential; moderately distinct to distinct on radial surface. Ripple marks are very common and provide a valuable diagnostic feature. Vertical canals, normal or of the gummosis type, are characteristic of several genera.

Vessels with simple perforations and occasionally provided with spiral thickenings; with the exception of the Bauhineae, the bordered pits are vestured, a feature found also in some of the other families; vessel-ray pits half-bordered. Rays homogeneous or heterogeneous; uniseriate or multiseriate. Fibers thin- or thick-walled, have simple pits, sometimes septate, and may have a mucilaginous inner layer.

The Leguminosae are divided into three groups and these are treated by some botanists as separate families, though the differences between them are not well marked. These three families or subfamilies are: (1) Mimoseae (Mimosaceae); (2) Caesalpinieae (Caesalpiniaceae); and (3) Papilionatae (Fabaceae).

I. MIMOSEAE (Mimosaceae)

Generally trees or shrubs with bipinnate leaves, except in *Inga*. Flowers small, regular, the petals all alike and equal or nearly so; petals valvate in bud and usually united below the middle; stamens distinct or united.

1. ACACIA Willd.

Shrubs or small to medium-sized trees, armed with spines or prickles. Leaves bipinnate, with few or numerous leaflets, and provided with glands. Flowers small, in heads or spikes, and with very numerous stamens. Timber is not used locally.

Wood white with extensive pale or dark gray patches caused by stain; fairly lustrous; odorless and tasteless; medium- or coarse-textured; of light or medium weight; slightly fibrous, easy to work; strong for its weight. Parenchyma paratracheal, sometimes aliform; indistinct or distinct without lens. Pores large; few to moderately numerous and without definite arrangement; solitary, less frequently in radial multiples; sometimes closed by parenchyma or filled with gum. Rays fine and unevenly spaced on cross section; usually invisible without lens on other surfaces.

Acacia Farnesiana (L.) Willd. Sp. Pl. 4: 1083. 1806. *Huaranga*.

Low tree or tall shrub, armed with stout spines. Crown flat, with wide-spreading branches. Flowers fragrant, with showy pink-

ish corolla and bright yellow stamens. In thickets, pastures, or dense forest, and sometimes cultivated (alt. 500–1,800 ft.).

Loreto: Sapote-yaco, lower Huallaga, *4914;* near Río Mayo, *6274;* collected also at La Merced, Department of Junín (alt. 2,000 ft.).

Acacia paniculata Willd.(?), Sp. Pl. 4: 1074. 1806. *Pashaco.*

Medium-sized tree, often up to 50 feet in height but said to attain greater stature. Crown flat or irregular. Trunk straight, cylindrical, 22 inches in diameter, clear of branches for upwards of half the height, and with small buttresses. The tree is readily distinguishable on account of its bright yellow and showy flowers. —Rather common in the lowland; usually in old clearings or along margin of forest (alt. 450 ft.). Timber is used for fence posts and fuel.

Sapwood sharply defined, variable from white to grayish and fairly lustrous; heartwood dull, dark chocolate brown, thin. Wood light in weight and soft. Parenchyma fairly abundantly developed; paratracheal. Pores solitary or in radial multiples.

Loreto: lower Nanay, *660.*

Acacia polyphylla DC. Cat. Hort. Monsp. 74. 1813; Prodr. 2: 469. 1825. *Pashaco.*

Small tree, about 18, occasionally up to 30, feet in height. Crown open. Trunk straight, slender, columnar, and free of branches up to 7 feet.—Common; in second growth along the banks of the Itaya River, also at Caballo-cocha, and in the vicinity of the Putumayo (alt. 350–400 ft.); the species has a wide distribution in tropical America and is known to occur in Brazil, the Guianas, Paraguay, and Colombia. The timber has no local application.

Wood pale brown or yellowish, with a grayish cast caused by stain; fairly lustrous; slightly harder and heavier than *A. paniculata.* Growth rings faintly visible. Parenchyma more abundantly developed around the pores than in the other species. Dark gum present in vessels. Rays barely discernible on all surfaces.

Loreto: Caballo-cocha, *2097.*

Additional numbers determined provisionally:

Loreto: lower Nanay, *553;* lower Huallaga, *4309;* near Iquitos, *8023.*

2. CALLIANDRA Benth.

Calliandra angustifolia Spruce ex Benth. Trans. Linn. Soc. 30: 539. 1875. *Bobensana.*

Unarmed tree, 15 to 36 feet high. Crown flat or spreading. Trunk erect, cylindrical, slender, and branching from base or clear of limbs up to more than half the height. Bark thin, light to purplish brown. Leaves twice-pinnate. Flowers pinkish red, showy. Pods linear, flat, reddish brown; February–March.—In open patches in forest, more frequently along gravelly banks of streams (alt. 400–3,500 ft.). Timber is used for house construction.

Wood almost white or pale yellow to light brown, usually with extensive grayish areas or dark brown streaks caused by stain; odorless and tasteless; straight-grained; medium-textured; heavy or moderately so, tenacious, and strong; moderately easy to work and takes a smooth, fairly lustrous finish; probably durable. Growth rings indistinct. Parenchyma paratracheal and in broad, broken, irregularly spaced, concentric bands; readily visible to unaided eye. Pores distinguishable only with lens; not numerous and well distributed; solitary, in multiples, seldom in small clusters; open or closed. Vessel lines barely discernible without lens; often filled with dark reddish brown gum. Rays fine, undulating, and visible only under lens on moistened cross section; at limit of vision on tangential and radial surfaces.

Rays heterogeneous; 1–2–3 cells wide. Strands of calcium oxalate common.

Loreto: lower Nanay, *412*.—San Martín: San Roque, *6930*, *7719*.

3. **ENTADA** Adans.

Entada polyphylla Benth. in Hook. Journ. Bot. 2: 133. 1840. *Pashaco.*

Slender tree or shrub, sometimes scandent, up to 22 feet tall. Crown open; branches armed with small spines. Trunk straight or inclined and free of limbs up to 8 feet. Bark pale to dark brown, with coarse, vertical fissures; yields a slightly sweet, pale yellow resin which is sometimes used for dyeing leather black. Petals greenish yellow, anthers green, and staminal filaments creamy white; flowering in December–January.—Common in thickets or along edge of savanna (alt. 1,400 ft.).

Wood lustrous yellowish white, darkening to yellowish brown on exposure to sunlight; has no distinctive odor or taste; straight-grained; medium-textured; light in weight, but compact and firm; slightly fibrous, easy to work, and takes a smooth finish; susceptible to insect attacks. Growth rings visible owing to arrangement of pores.

Parenchyma paratracheal; indistinct. Larger pores at limit of vision; rather numerous, occasionally ring-porous; solitary or in radial, diagonal, or tangential multiples or rows of 2–4; mostly open. Vessel lines fine and of same color as or slightly darker than background; lustrous tyloses occasionally present. Rays fairly fine or barely distinguishable without lens on moistened cross section; indistinct on tangential; distinguishable on radial surface.

San Martín: Tarapoto, *5576*.

4. INGA Scop.

Small or medium-sized, unarmed trees. Leaves once-pinnate, with few large leaflets; petiole often winged. Flowers large, white or greenish, in spikes, racemes, heads, or umbels; stamens numerous, very long, and hair-like. Fruit a large pod, variable as to form, containing few large seeds surrounded by a sweet white edible pulp. The trees are most abundant in northeastern Peru, particularly in the lowland, and are much planted for their fruits and for shade. The timber is not of commercial importance and is used locally only for fuel and miscellaneous minor purposes.

The vernacular name "shimbillo" is applied in northeastern Peru to almost all species of *Inga*.

Sapwood yellowish white to pinkish, lavender, or dark grayish brown, often with a grayish cast; heartwood pale to dark reddish brown. Wood odorless and tasteless; medium- to coarse-textured; light and soft to heavy and hard; often highly lustrous; sometimes fibrous or splintery, at other times compact and capable of taking a smooth polish; often durable. Parenchyma is developed in varying amount; in some species it occurs in distinct patches about the pores and in grayish white tangential bands connecting them irregularly, in others it is indistinct. Pores of medium size to fairly large; numerous and well distributed; solitary or in radial multiples, seldom in small clusters; sometimes filled with calcium or black gum. Rays numerous, fine, indistinct or distinct on cross section; sometimes visible without lens on tangential, where they are numerous and darker than background owing to dark gum present in the cells; usually very distinct on radial surface where they appear darker than background. Ripple marks are absent, although the rays often produce a very irregular wavy pattern on tangential surface which at times approaches the formation of ripple marks.

Rays homogeneous; 2–5 cells wide; dark gum present in abundance in ray cells. Fiber pits large. Strands of calcium oxalate also common.

Inga edulis Mart. Flora 20, pt. 2: Beibl. 113. 1837. *Guava.*

Small tree, seldom exceeding 35 feet in height. Crown broad and almost flat. Trunk usually contorted, cylindrical, 12 inches or more in diameter, and branching a few feet from the base. Bark thin, pale grayish or pinkish brown, with short, horizontal, low ridges of lighter color than the bark. Leaflets in 4–6 pairs, variable in form from oblongate to elliptic, acuminate and often twisted.—Common; in thickets and wooded swamps (alt. 380–1,800 ft.).

Wood pale yellow or almost white to light brown throughout, often with black or pale violet streaks caused probably by stain; has no distinctive odor or taste; straight-grained; coarse-textured; light to heavy, hard or moderately hard, and firm; saws slightly woolly, easy to cut; liable to split in drying; susceptible to insect attacks. Growth rings absent or indistinct. Parenchyma in rather prominent sheaths encircling the pores and infrequently uniting them. Pores moderately large and at limit of vision; fairly numerous and well scattered; solitary or in radially disposed multiples of 2–3, infrequently in tangential pairs; mostly open. Vessel lines prominent, short or long, and frequently filled with black gum. Rays distinguishable only with lens on all surfaces.

Loreto: lower Itaya, *273;* Pebas, *1997;* Caballo-cocha, *2690;* Yurimaguas, *4223;* near Iquitos, *7893.*—San Martín: Juan Guerra, *6896;* San Roque, *7354.*

Inga graciliflora Benth. in Hook. Lond. Journ. Bot. 4: 582. 1845.

Medium-sized tree, about 50 feet in height. Crown spreading. Trunk moderately straight, round, slender, and clear of limbs for about half the height. Bark thin, yellowish to dark brown; inner bark slightly fibrous. Leaflets usually in 3 pairs, ovate or slightly oblique, lustrous above, glabrous or minutely pubescent on both surfaces. Inflorescence capitate; staminal filaments white; flowering in April–May.—Uncommon; in dense forest in dry loam along the banks of the Itaya and Nanay rivers (alt. 400 ft.).

Wood pale yellow or light pinkish brown with grayish markings of vessel lines; straight- or roey-grained; medium-textured; hard, rather heavy, and compact; not easy to work and holds its place well when finished; appears to be durable. Growth rings faintly visible at times, owing to slight variation in abundance of elements. Parenchyma paratracheal and more prominent than in *I. edulis,* also confluent and in broken or fairly continuous, slightly wavy, con-

centric lines or bands. Rays very fine and barely visible with lens on all surfaces.

Loreto: upper Nanay, *684*.

Inga ingoides Willd. Sp. Pl. 4: 1012. 1806.

Tree, 30 to 65 feet tall. Crown flat or fairly round. Trunk straight, columnar, approximately 13 inches in diameter, and clear of limbs for 3 to 25 feet. Bark pale yellow or light brown, with short, horizontal, dark fissures. Flowers pale yellow; May–June.—Fairly common in the lowland; in clearings and thickets (alt. 380–600 ft.).

Sapwood oatmeal-colored with dark brown or black streaks; heartwood dull brown, thin. Wood of medium density to moderately heavy; splintery and liable to check in drying. Growth rings visible on account of some variation in depth of color. Parenchyma surrounding the pores and aliform. Pores distinguishable without lens, but not prominent; mostly solitary, also in radial multiples of 2–4, less frequently tangentially disposed. Vessel lines of darker color than adjacent elements. Rays faintly visible on moistened tangential section; distinguishable against the lighter background on radial.

Loreto: La Victoria, *2694;* upper Itaya, *3293*.

Inga marginata Willd. Sp. Pl. 4: 1015. 1806. *Shimbillo colorado.*

Tree, 25 to 55 feet tall. Crown flat or spreading. Trunk slightly contorted, fairly round, 10 to 16 inches in diameter, and branching from near the base. Bark pale or purplish brown, about 0.5 inch thick, with short, horizontal ridges. Flowers white, fragrant; May–June. Fruiting in September–October.—Common throughout the lowland; in dry clearings or close to streams (alt. 400–500 ft.). Timber is not employed locally.

Sapwood pale yellow or pinkish brown with darker brown striping of vessel lines; heartwood dark reddish brown, thin. Wood light and soft to moderately heavy, compact, and tenacious; fairly easy to work and takes a smooth, lustrous finish; probably durable, although liable to check in drying. Growth rings absent or poorly defined. Vessel lines rather prominent against the lighter-colored background. Rays not visible without lens on cross section; barely discernible on tangential; visible, but not prominent, on radial surface.

Loreto: lower Itaya, *9* (*I.* aff. *marginata*), *92;* lower Nanay, *499;* La Victoria, *3184;* Fortaleza, *4217;* and Sapote-yaco, lower Huallaga, *4927*.

Inga pilosiuscula Desv.(?), Journ. Bot. 3: 71. 1814. *Shimbillo-rujinti.*

Tree, 20 to 35 feet tall. Crown open. Trunk slender, often contorted, and clear of branches up to 8 feet. Bark pale yellowish or pinkish brown, with numerous, small, dark brown lenticels; inner bark rather fibrous. Flowers white; May–June. Pods about 6 inches long, with dark brown seeds.—Limited in its distribution; usually near banks of streams (alt. 500 ft.). Wood is not employed locally.

Sapwood pale yellowish brown with a grayish cast; heartwood dull brown. Growth rings visible owing to arrangement of elements. Parenchyma in broad bands surrounding the pores and in broken or fairly continuous, broad, concentric bands uniting the pores; readily visible without lens. Vessel lines prominent on account of parenchyma sheaths. Rays indistinct or faintly visible on cross and tangential sections; distinguishable against the lighter-colored background on radial surface.

Loreto: upper Nanay, *939*, *1143*.

Inga plumifera Spruce ex Benth. Trans. Linn. Soc. 30: 621. 1875. *Cotochupa.*

Uncommon tree, up to 45 feet in height. Crown spreading. Trunk moderately round, bent, slender, and free of branches up to about 18 feet. Bark pale brown with small, darker brown lenticels. Pods approximately 12 inches long and 1 inch thick, with round seeds; fruiting in June–July.—In dense forest not subject to inundations (alt. 500 ft.); said to be common along the Rio Uaupes in Brazil.

Wood pale brown with pale violet or dark grayish streaks; of medium weight, hard, and compact; splinters easily; probably durable. Growth rings faintly visible owing to alinement of elements. Parenchyma abundantly developed and distinct; in broad sheaths surrounding the pores and in short, fairly continuous, concentric bands (as in *I. pilosiuscula*). Pores open or filled with pale yellowish deposit. Vessel lines long and prominent on account of dark contents.

Loreto: upper Nanay, *958*.

Inga punctata Willd. Sp. Pl. 4: 1016. 1806. *Rufindi.*

Tree, 20 to 40, at times up to 60, feet in height. Crown spreading and broad. Trunk straight, cylindrical, 12 inches or more in diameter, and clear of limbs up to 25 feet. Bark about 0.75 inch thick, pale yellow or grayish to light brown, and fairly smooth.

Leaflets in two pairs, ovate or ellipsoid, acuminate, acute at base, lustrous on upper surface. Flowers in short spikes, with pale green petals and white filaments. Pods compressed or round on cross section and often curved, deep green when mature.—Common in both the lowland and upland (alt. 400–4,500 ft.); in dry loam in clearings, along margin of forest, and occasionally along steep grass-covered hill slopes. Reported also from Río Santo Domingo, upper Huallaga (alt. 4,000 ft.), at La Merced, in the Colonia Perene, and near the estuary of the Tigre, middle Marañón.

Sapwood pale yellowish white with long, narrow, grayish or pale brown streaks caused by sapstain; heartwood brown and perishable. Wood of medium weight or fairly heavy; liable to check in drying; does not appear to be durable. Growth rings visible owing to some variation in depth of color. Parenchyma distinct to aided eye; in rather broad bands surrounding the pores, at times in short, tangential bands uniting the pores, infrequently in fine, slightly wavy, concentric lines. Pores at limit of vision. Vessel lines readily distinguishable against the lighter-colored background.

Loreto: Caballo-cocha, *2446;* upper Itaya, *3512;* Iquitos, *3662;* Yurimaguas, *4599.*—San Martín: San Roque, *7394.*

Inga quaternata Poepp. & Endl. Nov. Gen. et Sp. 3: 79. 1845.

Shrub or small tree, up to 15 feet in height. Crown round or spreading. Trunk straight, cylindrical, slender, and branching from the base or clear of limbs up to about half the height. Bark thin, reddish, or violet to dark brown, with small, short, horizontal ridges. Flowers with green petals and pinkish white filaments; June–July.—Widely scattered, but nowhere common (alt. 380–500 ft.); in clearings or along margin of forest.

Sapwood well defined, yellowish brown with slaty gray areas caused by sapstain; heartwood brown. Wood straight-grained; medium- or coarse-textured; light and soft to moderately heavy and compact. Growth rings absent or visible owing to some variation in depth of color. Parenchyma paratracheal; distinct. Vessel lines readily visible owing to parenchyma sheaths. Rays distinguishable only with lens on cross and tangential sections; darker brown than adjacent elements on radial.

Loreto: La Victoria, *3185;* Yurimaguas, *3944.*

Inga Ruiziana G. Don, Gen. Syst. 2: 391. 1832.

Tree, up to 40 or 50 feet in height. Crown spreading. Trunk moderately straight, cylindrical, and up to 15 inches in diameter.

Bark pale grayish green or yellow, smooth or fairly rough. Leaflets in 3 or 4 pairs, ellipsoid, acuminate, acute or rounded at base, finely pubescent on both surfaces; petiole not winged. Flowers white; June–July.—Abundant in the lowland, especially in the lower Peruvian Amazon region (alt. 380 ft.); in dry loam in old clearings or along margin of forest; collected also near the estuary of the Santíago River, an affluent of the Marañón.

Sapwood with creamy yellow or pinkish brown streaks and fine dark gray lines; heartwood reddish brown, thin. Wood moderately heavy to heavy, firm, and compact; appears to be durable. Growth rings visible. Parenchyma paratracheal. Pores open or filled with yellowish deposit. Vessel lines fine or readily distinguishable owing to parenchyma sheaths. Rays visible to unaided eye on radial surface only.

Loreto: Pebas, *1753;* Caballo-cocha, *2288.*

Inga sertulifera DC. Prodr. 2: 436. 1825.

Tall shrub or straggly tree, up to 30 feet in height. Crown spreading. Trunk straight, columnar, slender, and clear of limbs for about one-fourth the height. Bark reddish or yellowish to dull grayish brown, with short, horizontal ridges and numerous lenticels. —Not common; in thickets or dense forest free from seasonal floods (alt. 450–1,500 ft.).

Wood dull pale brown, with a faint yellowish cast and occasionally with dark striping; moderately heavy, firm, and compact; fairly easy to work and holds its place well when finished; probably durable. Growth rings visible owing to slight variation in abundance of elements. Parenchyma in broad bands surrounding the pores and in irregular, broken, concentric bands uniting the latter; visible to unaided eye. Pores not distinguishable without lens; open or closed. Vessel lines fine, mostly long; frequently containing dark gum. Rays barely discernible without lens on radial surface.

Loreto: upper Nanay, *846.*—San Martín: Rumisapa, near Tarapoto, *6800.*

Inga stenoptera Benth. in Hook. Journ. Bot. 2: 143. 1840.

Tree, up to 80 feet tall. Crown spreading. Trunk straight, columnar, 12 to 20 inches in diameter, and free of branches up to 24 feet. Bark pale yellow or dark brown, rough; inner bark slightly fibrous; exudes when incised an abundance of bitter, dark brown resin.—Not common; in dense forest subject to seasonal inundations (alt. 380 ft.).

Sapwood pale yellow, with violet brown and grayish areas; heartwood dark brown, thin. Wood moderately heavy and splinters rather easily; liable to check in drying and susceptible to insect attacks. Growth rings present owing to slight variation in color. Parenchyma in association with pores and sometimes confluent. Pores open or closed. Vessel lines rather fine, short or long, and usually discernible owing to dark gum frequently present. Rays distinguishable only with lens on all surfaces.

Loreto: Caballo-cocha, *2158*.

Inga strigillosa Spruce ex Benth. Trans. Linn. Soc. 30: 612. 1875.

Tree, approximately 50 feet tall. Crown spreading. Trunk branching a few feet from the base. Bark pale yellowish or reddish brown; inner bark reddish brown and slightly fibrous. Flowers white; May–June.—Of limited distribution; in dense forest free from floods (alt. 400 ft.).

Wood uniform light brown; of medium weight; saws rather woolly and is splintery; checks in drying. Growth rings visible. Parenchyma in association with the pores; discernible only with lens. Pores distinguishable to unaided eye; mostly open. Vessel lines short and rather prominent owing to the parenchyma sheaths. Rays faintly distinguishable to unaided eye on moistened tangential and radial surfaces.

Loreto: Caballo-cocha, *2483*.

Inga velutina Willd.(?), Sp. Pl. 4: 1014. 1806. *Rosca-shimbillo*.

Medium-sized tree, 60 feet or more in height. Crown spreading. Trunk straight, columnar, 13 to 18 inches in diameter, and branching a few feet from the base. Bark pale yellow or gray, with short, low, horizontal ridges; inner bark slightly fibrous.—Uncommon; in old clearings or along margin of forest free from periodical floods (alt. 500 ft.). Timber is used to a small extent for general carpentry.

Sapwood pale grayish or pinkish brown; heartwood dark brown, thin. Wood saws slightly woolly, takes a smooth finish, and holds its place well; probably durable. Growth rings faintly visible owing to some variation in depth of color and abundance of elements. Parenchyma paratracheal; not distinct. Pores visible to unaided eye; open. Vessel lines short or long and prominent against the lighter-colored background. Rays barely at limit of vision on moistened tangential section; of darker color than background and visible without lens on radial surface.

Loreto: Santa Rosa, lower Huallaga, *4777*.

The following numbers of the genus *Inga* remain to be determined specifically:

Loreto: lower Nanay, *551, 727, 754, 755, 770;* upper Nanay, *838, 843, 981, 1013, 1138;* near Iquitos, *97, 1549, 3736;* Pebas, *1612, 1755, 1768, 1883;* Caballo-cocha, *2206, 2410, 2437;* La Victoria, *2647, 2958, 3107;* lower Huallaga, *3835, 3982, 4238, 4531, 4783.*—San Martín: Tarapoto, *5465, 6180, 6575;* Juan Guerra, *6866, 6885, 6897;* San Roque, *7057.*

5. **PIPTADENIA** Mart.

Piptadenia flava (Spreng.) Benth.(?), Trans. Linn. Soc. 30: 371. 1875. *Pashaco, Pashaquillo, Uña de gato.*

Prickly shrub, at times attaining the size of a medium-sized tree, from 50 to 60 feet tall. Crown round or open. Trunk usually branching from base. Bark yellowish to dark brown, scaly, and with small lenticels; inner bark reddish brown. Flowers wine red and filaments yellow or reddish brown; June–July.—Not common; in slightly humid loam in brushwood (alt. 400–450 ft.). Wood not used locally except for fuel.

Sapwood pale yellow or almost white with fine brown markings of vessel lines and frequently with black veining and grayish areas caused probably by sapstain; heartwood reddish brown, well demarcated. Wood has no distinctive odor or taste; straight-grained; coarse-textured; moderately light in weight, but firm and strong; requires a sharp knife to cut smoothly across grain, easy to work, saws slightly woolly, takes a fairly lustrous finish; durable. Growth rings absent or poorly defined. Parenchyma paratracheal, aliform, and in short, irregular, tangential bands uniting the pores; clearly visible with lens. Pores rather large and at limit of vision; few, well scattered or showing tendency to alinement in concentric rows; mostly solitary, also in small radial, diagonal, or tangential multiples; open or filled with black gum. Vessel lines long, coarse, and darker than background on account of parenchyma sheaths. Rays moderately fine, lighter-colored than fibers on cross section; indistinct on tangential; discernible to unaided eye on radial surface when held to proper light.

Loreto: lower Nanay, *514;* Paraíso, upper Itaya, *3311.*

6. **PITHECOLOBIUM** Mart.

Shrubs or trees, armed or unarmed. Leaves twice pinnate, the few or numerous leaflets large or small. Flowers rather small but often showy, in heads, spikes, or umbels; stamens numerous, united

below into a tube. Fruit very variable, the valves often thickened and coiled or twisted. Timber is esteemed locally for tool handles, canoe paddles, made mostly from the narrow buttresses, also for house posts and general carpentry.

Sapwood whitish or yellowish to pale brown, usually with a grayish tinge; heartwood dark brown. Wood odorless and tasteless; medium- to fairly coarse-textured; of light or medium weight; sometimes saws woolly, but is capable of taking a smooth, moderately or highly lustrous polish; fairly durable or durable. Parenchyma paratracheal, less often confluent; distinct with lens. Pores large; few and well scattered; solitary, infrequently in small radial or diagonal multiples; sometimes filled with dark gum. Rays fine or fairly fine on cross section; sometimes visible without lens on tangential; of lighter color than background and at times barely visible without lens on radial surface.

Rays homogeneous; 1–3 cells wide. Long strands of calcium oxalate common.

Pithecolobium laetum Benth. in Hook. Lond. Journ. Bot. 3: 203. 1844. *Remo-caspi.*

Tall shrub or small tree, up to 35 feet in height. Crown spreading; branches elongated. Trunk erect, fluted, 13 inches or more in diameter, and clear of limbs up to 25 feet. Bark light to dark brown with a grayish cast, and fairly smooth; an infusion prepared by boiling the bark in water is reputed to be used as a remedy for tertiary fever. Flowers white, with greenish white petals and pale pink filaments; September–October.—Fairly common in the lowland forest, especially in the lower Huallaga (alt. 400–500 ft.). Timber esteemed locally for tool handles and more particularly for canoe paddles, hence the local name "remo"=paddle, "caspi"=wood.

Sapwood fairly well defined, pale yellow with a faint pinkish cast and long dark brown striping caused by sapstain; heartwood light brown. Wood odorless and tasteless; straight-grained; medium- or rather coarse-textured; of light or medium weight; requires a sharp knife to cut smoothly across grain, takes a dull finish; fairly durable. Growth rings absent or poorly defined. Parenchyma paratracheal; of darker brown color than adjacent elements and visible only with lens. Pores of medium size, sometimes at limit of vision; few and well scattered; solitary or in rows or multiples of up to 4, infrequently in diagonal pairs; open or closed. Vessel lines conspicuous on account of parenchyma sheaths; grayish white and

black gum deposits frequently present. Rays very fine, numerous, closely spaced, and barely visible with lens on cross section; indistinct with lens on tangential; sometimes distinguishable without lens on moistened radial surface.

Loreto: Yurimaguas, *4444*.

Pithecolobium Mathewsi Benth. in Hook. Lond. Journ. Bot. 3: 222. 1844. *Algarrobo.*

Tree, 25 to 45 feet in height. Crown flat. Trunk fairly straight or contorted, fluted, from 10 to 15 inches in diameter, and clear of limbs for from 1 to 18 feet. Bark extremely thin, yellowish or reddish brown, bitter to taste, fairly smooth or slightly rough, and exudes a bitter, translucent, viscid resin; an infusion obtained by boiling the bark in water is said to be efficacious in the treatment of malarial fever. Flowers yellowish white; January–February.—Common; in open, sandy loam on the plain of Tarapoto (alt. 1,400 ft.). Timber is highly esteemed locally for house posts and general carpentry.

Sapwood pale or bright yellow, fairly well defined; heartwood greenish yellow when fresh, turning on exposure to pale brown. Wood odorless and tasteless; straight- or irregular-grained; medium-textured; of medium weight to rather heavy, strong; rather fibrous, easy to work, takes a lustrous polish; fairly durable. Growth rings present owing to variation in abundance of parenchyma. Parenchyma paratracheal and in irregular, short, tangential bands uniting the pores, infrequently in fine, concentric lines; distinct under lens. Pores of rather small or medium size; fairly numerous, well scattered; solitary or infrequently in small radial or diagonal multiples, often united into tangential chains by the parenchyma. Vessel lines appear as fine scratches, sometimes of light brown color and visible on account of parenchyma sheaths. Rays numerous, very fine, and faintly visible with lens on cross section; indistinct on tangential; lighter colored than background and barely visible with lens on radial surface.

San Martín: near Tarapoto, *5532*, *5967*(?); Lamas, *6463*.

Pithecolobium Saman Benth. in Hook. Lond. Journ. Bot. 3: 216. 1844. *Huacamayo-chico.*

Small tree, about 28 feet in height. Crown dense, round. Trunk straight, cylindrical, approximately 6 inches in diameter, and free of branches for more than half the height. Bark 0.5 inch thick, pale yellow or greenish, spongy, and with long, coarse fissures; inner bark light brown and fibrous.—Not common; in open, sandy loam among

low trees and shrubs of second growth (alt. 1,300 ft.); the species is said to be indigenous in the West Indies, and is reported also from eastern Brazil, Colombia, and Ecuador. Timber is employed for general carpentry and to a less extent for house construction.

Wood almost white or pale yellow with dark veining of vessel lines; tasteless, but slightly fragrant; straight-grained; rather coarse-textured; moderately light in weight, firm, strong; slightly fibrous, but inclined to be tenacious, and takes a fairly lustrous finish; likely to check in drying. Growth rings present owing to alinement of pores in concentric zones. Parenchyma surrounding the pores and in short bands uniting them. Pores not numerous, have a tendency to zonal arrangement; solitary or less frequently in small radial, diagonal, or tangential multiples; open. Vessel lines coarse and of darker color than adjacent elements. Rays rather fine and discernible with lens on cross section; occasionally distinguishable to aided eye on tangential; of lighter color than adjacent elements and barely discernible without lens on radial surface when held to proper light. Pith brown, narrow, round.

San Martín: near Tarapoto, *5495*.

II. CAESALPINIEAE (Caesalpiniaceae)

Trees or shrubs, rarely herbs, with pinnate or bipinnate, seldom simple, leaves. Flowers various, sometimes large and brightly colored, at other times small and inconspicuous, generally in racemes, less often spicate; the uppermost petals in bud within the others; stamens usually distinct. The fruit is a flat pod which opens elastically.

1. BAUHINIA L.

Shrubs or small trees, sometimes climbing, frequently armed with spines and the stems often compressed. Leaves simple and palmately nerved, bilobate, or sometimes composed of 2 leaflets. Flowers mostly large and showy, in racemes. Fruit flat, indehiscent or bivalvate. Timber is used locally to a limited extent for crating and general carpentry.

Sapwood yellowish or grayish brown; heartwood dark chocolate brown. Wood fairly fine- or medium-textured; of medium weight to heavy; easy to work; fairly durable. Parenchyma paratracheal and in rather distinct, continuous, less often broken, concentric bands, sometimes diagonally disposed. Pores rather small to medium-sized; fairly numerous and uniformly scattered; solitary or in small radial multiples; mostly open. Rays fine, rather numer-

ous, and evenly spaced on cross section; indistinct on tangential; at times fairly distinct on radial surface. Ripple marks present; all elements storied; number per inch length, up to 120.

Rays homogeneous; mostly uni- or biseriate. Pits not vestured in Bauhinieae.

Bauhinia tarapotensis Benth., ined. *Vaina de machete.*

Tree, 40 feet tall. Crown spreading. Trunk straight, columnar, 12 to 15 inches in diameter, and free of limbs for one-third the height. Bark dark brown, fairly smooth; inner bark coarsely fibrous.—Common in clearings in the lower Itaya (alt. 400 ft.); collected also in dense forest at Puerto Bermudez (alt. 1,200 ft.), and by Spruce at Tarapoto. Timber is used to a limited extent for house construction.

Sapwood light brown, lustrous; heartwood dull brown, thin. Wood has no characteristic odor or taste; straight- or irregular-grained; medium-textured; of medium weight and tenacious; moderately easy to work, saws rather woolly; probably durable. Growth rings indistinct or present. Parenchyma abundantly developed; paratracheal and in broad, evenly spaced, concentric bands, readily discernible without lens. Pores small; not numerous, uniformly scattered; solitary and round in outline, less frequently in radial multiples of 2–3, rarely more; open. Vessel lines fine, long, and distinguishable without lens on account of the pale yellowish white deposit usually present. Rays fine; visible only with lens on cross and tangential sections; barely discernible without lens on radial surface.

Loreto: lower Itaya, *186.*

The following numbers have been determined provisionally on the basis of wood specimens:

Loreto: lower Itaya, *156;* upper Itaya, *3385;* lower Huallaga, *5035, 5250.*—San Martín: Tarapoto, *5512.*

2. CAESALPINIA L.

Caesalpinia pulcherrima (L.) Sw. Obs. Bot. 166. 1791. *Angelsisa, Flor del ángel, Frijol.*

Glabrous shrub or small, prickly tree, up to 20 feet in height, and frequently planted for ornament. Crown spreading. Trunk straight, cylindrical, slender, and unbranched for 3 feet or more. Bark light brown, moderately thin, almost smooth; inner bark pale pinkish brown. Leaves bipinnate, with numerous, small, narrow leaflets suggesting honey locust (*Gleditsia*). Flowers large, red or yellow, fragrant. Fruit a compressed, dehiscent pod.

Sapwood well defined, yellowish white, thin; heartwood pale pink or lustrous golden brown to dull brown. Wood has no distinctive taste, but has a faint rancid odor; straight-grained; fine-textured; heavy, strong, compact; susceptible to insect attacks. Growth rings distinct in some specimens owing to alinement of pores. Parenchyma fairly abundantly developed; surrounding the pores. Pores small; numerous, not crowded; solitary, less often in radial rows of 2–3; mostly open. Vessel lines fine and of varying length. Rays fine or fairly fine, numerous, and barely discernible with lens on cross section; indistinct on tangential; faintly distinguishable in proper light on radial surface. Ripple marks present, but usually very indistinct; all elements storied; number of "marks" per inch length, about 100.

Intervascular pits fairly large; vessel-ray pits of same size as intervascular. Rays heterogeneous; mostly 2 cells wide.

Loreto: lower Itaya, *214;* lower Nanay, *411.*—San Martín: Tarapoto, *5475.*

3. CAMPSIANDRA Benth.

Campsiandra laurifolia Benth. in Hook. Journ. Bot. 2: 93. 1840. *Huacapurana, Pampa-huacapurana.*

Forest tree, 65 to 90 feet tall. Crown spreading. Trunk straight or fairly so, cylindrical, 8 to 24 inches in diameter, and free of branches up to 40 feet. Bark grayish black, moderately thick, with small excrescences. Flowers small, yellow or red; June–July. Pod up to 9 inches long, with large, round seeds.—Widely distributed in the lowland (alt. 380 ft.); often encountered in semi-humid areas. Timber is highly esteemed for general construction and fuel.

Sapwood not well defined, light brown with occasional yellowish areas or dark streaks; heartwood dark reddish brown. Wood tasteless; fairly straight-grained; medium- or coarse-textured; hard, heavy, and strong; not easy to work; durable. Growth rings indistinct or absent. Parenchyma abundantly developed and distinct; paratracheal, confluent, sometimes aliform. Pores of medium size to large; not numerous, well distributed; solitary, less frequently in radial multiples of 2–3; open or closed. Vessel lines long and prominent; often filled with grayish white deposits. Rays closely and irregularly spaced, and distinguishable only with lens on cross section; invisible or barely at limit of vision on tangential; darker than background and fairly distinct on radial surface; homogeneous; 2–4 cells wide.

Loreto: upper Nanay, *1142;* Caballo-cocha, *2345;* La Victoria, *2871.*

4. CASSIA L.

Unarmed trees or shrubs. Leaves pinnate, the leaflets large or small. Flowers usually yellow, commonly large and showy, racemose, paniculate, or solitary. Pods flat and thin, linear, dehiscent or indehiscent. Timber is little used locally.

Sapwood yellowish to pale brown, often with a grayish tinge and sometimes with dark brown patches; heartwood chocolate brown or almost black. Wood odorless and tasteless; medium- or rather coarse-textured; light and soft to medium density and firm; usually requires a sharp knife to cut smoothly across grain, but easy to plane; stains in drying and is not very durable. Parenchyma paratracheal, aliform, and in indistinct or distinct, broad, tangential bands between the rays and sometimes uniting the pores. Pores of medium size to rather large; moderately numerous, diffuse- or inclined to ring-porous; infrequently filled with deposit of calcium. Rays fine or moderately fine on cross section; indistinct on tangential; sometimes discernible, but not prominent, on radial surface.

Rays homogeneous; sometimes uniseriate or partly biseriate, in others up to 5 cells wide. Crystals of calcium oxalate common in parenchyma strands.

Cassia chrysocarpa Desv. Journ. Bot. 3: 72. 1814. *Amargo-caspi, Flor de caña.*

Slender tree or tall shrub, up to 18 feet in height. Crown spreading. Trunk clear of branches up to 6 feet. Bark light brown, fairly smooth. The leaves are bitter to taste, whence the local name "amargo-caspi." Flowers yellow; July–August.—Fairly common in thickets and clearings along the banks of the Itaya, Nanay, and Amazon, also in the middle Huallaga region (alt. 400–1,600 ft.).

Sapwood variegated pale yellow or light brown and susceptible to insect attacks; heartwood dark brown or almost black.

Loreto: lower Itaya, *89;* lower Nanay, *566;* Pebas, *1762.*

Cassia marginata Willd. Enum. Hort. Berol. 443. 1809. *Retama, Sapechihua.*

Uncommon, slender tree, about 40 feet tall. Crown spreading. Trunk branching from base. Bark light gray, dark brown, or almost black. Leaflets oblongate, slightly pubescent above and below, emarginate, rounded at base. Flowers with pale yellow petals. Fruit pinkish, bivalvate.—In thickets or dense forest near bank of Nanay River (alt. 400 ft.). Timber used locally for fuel. An

infusion prepared by boiling the roots in water is said to be efficacious for fevers.

Sapwood lustrous grayish or pinkish brown; heartwood dull light or dark brown. Wood straight-grained; medium- or coarse-textured; splits readily and takes a smooth finish; not durable.

Loreto: lower Nanay, *367*.

Cassia multijuga Rich. Act. Soc. Hist. Nat. Par. 1: 108. 1792. *Pashaco sin espina, Quillo-sisa.*

Unarmed tree, 22 to 45, at times up to 60, feet in height. Crown round or spreading. Trunk straight, round or moderately so, up to 13 inches in diameter, and clear of limbs for more than half the height. Bark light gray or brown.—Widely distributed, but nowhere abundant, in the lowland (alt. 350 ft.) and in the vicinity of Lamas (alt. 1,600 ft.); in non-inundated clearings and thickets; the species is reported also from the Guianas, Colombia, and Central America. Wood is not employed locally.

Sapwood forms the greater part of the wood, oatmeal-colored, pale yellowish, or pinkish brown with a grayish cast or dark streaks, and has a silvery luster; heartwood dull dark reddish brown. Wood straight-grained; medium- or coarse-textured; fairly light in weight and rather soft or firm; saws woolly, but takes a smooth finish. Growth rings distinguishable in some specimens. Parenchyma in narrow bands surrounding the pores, also in short, fine, tangential bands which, at times, appear to be terminal. Pores at limit of vision; numerous, well distributed or with a tendency to concentric arrangement; solitary and round or oval in outline, less frequently in small radial multiples, rarely tangentially disposed; open. Vessel lines coarse, dark, and conspicuous. Rays fine and indistinct on cross section; visible only with lens on tangential surface; readily discernible, but not prominent, on radial surface.

Loreto: Pebas, *1754, 1980.*—San Martín: Lamas, *6458*.

Cassia occidentalis L. Sp. Pl. 377. 1753. *Aya-poroto, Ayak-poroto, Aya-parotillo, Retama, Retamilla.*

Small shrub, very abundant throughout the lowland; in clearings and sometimes cultivated. Flowers yellowish.

Herbarium material only.

Cassia racemosa Mill. Gard. Dict. ed. 8. No. 19. 1768. *Quillo-sisa.*

Tree, up to 50 feet in height. Crown spreading or almost round. Trunk moderately straight, cylindrical, about 12 inches in diam-

eter, and either branching from the base or free of limbs up to 10 feet. Bark grayish, bright red, or dark chocolate brown, with small lenticels. Leaflets oblong to oval-elliptic, acuminate at apex, acute or rounded at base, glabrous above, and pubescent beneath. Flowers with yellow petals; July–August.—Common in the lowland; in second growth or along margin of forest in non-inundated areas (alt. 400–500 ft.). Wood used mainly for fuel.

Sapwood thick, varying in color from grayish or yellowish to pale brown and with a fairly high luster; heartwood dull dark brown. Wood odorless and tasteless; straight- or interlocked-grained; medium-textured; light and soft to moderately heavy, hard, and compact; fairly easy to work and takes a smooth finish. Growth rings absent or poorly defined. Parenchyma paratracheal, infrequently in narrow, tangential bands, uniting the pores. Pores visible to unaided eye; fairly numerous and evenly distributed; solitary or in small radial rows or multiples; open. Vessel lines short or long, dark, and conspicuous; sometimes filled with lustrous, gummy contents. Rays distinguishable only with lens on cross and tangential sections; of same color as or darker than background on radial surface.

Loreto: Caballo-cocha, *2070, 2199;* La Victoria, *2608, 2897;* Yurimaguas, lower Huallaga, *3863, 7849.*

Cassia reticulata Willd. Enum. Hort. Berol. 443. 1809. *Retama, Sapechihua.*

Small tree, not exceeding 25 feet in height. Crown spreading. Trunk straight, columnar, slender, and free of limbs for 3 to 8 feet. Bark dark brown or almost black, moderately thin. Leaflets oblongate or obovate, rounded or slightly cuspidate at apex, finely pubescent on both surfaces. Flowers yellow, rather large, and showy. Pod dark brown, with thin flat valves.—Common in clearings or thickets throughout the lowland (alt. 400–500 ft.).

Sapwood distinctly demarcated, grayish to pale yellowish brown; heartwood dark chocolate brown, with a deep golden luster. Wood straight-grained; medium-textured; light in weight or moderately so, firm, and strong; easy to work and capable of taking a smooth finish.

Loreto: lower Itaya, *116, 134, 288;* Iquitos, *1475, 7899;* Pebas, *1735;* Caballo-cocha, *2145;* upper Itaya, *3264, 3349;* Yurimaguas, *3822.*

Cassia Ruiziana Vog.(?), Syn. Cass. 40. 1837. *Cornesuelo, Mataro.*

Shrub or small tree, up to 30 feet tall. Crown spreading. Trunk straight, round, and slender. Bark thin, grayish or dark brown.—In second growth (alt. 400–3,500 ft.). Wood is esteemed locally for general carpentry.

Wood variegated light brown throughout and darkening slightly on exposure; has a slightly offensive odor when fresh; straight- or interlocked-grained; fine- or medium-textured; of medium weight, strong, and compact; takes a smooth finish with a golden luster; probably durable.

San Martín: San Roque, *7067*.

Cassia viminea L. Syst. Nat. ed. 10. 2: 1016. 1759; Amoen. Acad. 5: 397. 1760. *Yana-huira.*

Slender tree, sometimes scandent, up to 22 feet in height. Crown spreading. Bark grayish brown, fairly smooth, and with minute lenticels. Leaflets ovate-oblong, acuminate, lustrous and glabrous above except along mid-vein, pubescent beneath. Flowers yellow, rather prominent; May–June. Fruit sculptured, light brown when mature; valves fairly thick and woody.—Abundant throughout the Department of Loreto and occasionally on the plain of Tarapoto (alt. 400–1,300 ft.), in open loam in second growth; reported also from near Manáos, Brazilian Amazon.

Sapwood pale grayish or pinkish brown. Occasionally with darker streaks; heartwood dull dark reddish brown. Wood moderately light, firm; takes a smooth finish with a luster; resembles *C. racemosa.*

Loreto: lower Itaya, *50;* lower Nanay, *365, 392, 532.*

5. COPAIFERA L.

Copaifera reticulata Ducke, Archiv. Jard. Bot. Rio Janeiro 1: 22. 1915. *Copaiba.*

One of the tallest trees in the flood-free forest of the lower Huallaga, up to 120 feet or more in height. Crown round. Trunk straight, cylindrical, 31 inches or more in diameter, free of branches up to 75 feet, and with small buttresses. Bark up to 1 inch thick, reddish or purplish brown. Wood when cut exudes a copious quantity of sweet, translucent gum, the commercial product known as copaiba balsam or "balsamo de copaiba," that collects in cavities in the heart of the tree and is gathered by tapping. It is used in a crude state

by the natives for medicinal purposes and for anointing the hair and body.

Sapwood fairly distinctly defined, pale brown with dark brown streaks; heartwood russet brown. Wood odorless and tasteless; straight-grained; medium-textured; heavy, strong, and firm; easy to work, finishes smoothly, takes a good polish, and holds its place well when finished; durable. Growth rings present. Parenchyma in narrow, irregularly spaced, tangential or concentric bands, also paratracheal and terminal. Pores barely at limit of vision; fairly numerous and well distributed; solitary or in small radial and tangential multiples; open or filled with dark gum and calcium deposits. Vessel lines long, coarse, and darker than background. Rays fine and visible only with lens or fairly broad on cross section; barely at limit of vision on tangential; darker than adjacent elements and distinct on radial surface; heterogeneous.

Normal vertical canals are present in terminal parenchyma layers, sometimes very numerous, at other times few; small and indistinct with lens; their presence indicated by exudations of small amounts of oil showing as streaks on longitudinal surface and as light-colored or dark spots on cross section.

Loreto: Santa Rosa, lower Huallaga, *4884*.

6. CRUDIA Schreb.

Crudia parivoa (Rich.) DC. Prodr. 2: 520. 1825. *Pisho.*

Tree, 35 feet in height. Crown open. Trunk straight, round, 9 inches in diameter, and clear of branches up to 25 feet. Bark pinkish or purplish brown, moderately smooth.—Common in the lower Huallaga (alt. 600 ft.); in dense forest. Timber employed for making furniture and spinning tops.

Wood light or pinkish brown throughout, with long, dark streaks or brown areas caused probably by stain; tasteless and odorless; straight-grained; medium-textured; of medium weight to fairly heavy and hard; moderately easy to work, takes a smooth finish, and holds its place well when finished; not durable and susceptible to insects. Growth rings occasionally present owing to slight variation in abundance of elements. Parenchyma abundantly developed; discernible at limit of vision as broad, evenly spaced, short or continuous, concentric bands uniting the pores, also terminal. Pores barely distinguishable without lens; not numerous and well distributed; solitary or in radial multiples or rows of 2–3. Vessel lines rather short and readily discernible to unaided eye on account

of light or dark brown gum present. Rays barely distinguishable with lens on cross and tangential surfaces; light brown and discernible, but not prominent, on radial section.

Loreto: Yurimaguas, *4176a.*

7. CYNOMETRA L.

Cynometra bauhiniaefolia Benth.(?), in Hook. Journ. Bot. 2: 99. 1840. *Herairo.*

Uncommon tree, 25 feet tall. Crown open. Trunk straight, round, 6 inches in diameter, and free of branches up to 10 feet. Bark dark brown with small, light brown lenticels.—In slightly humid soil or along banks of streams (alt. 380 ft.). Wood has no local application except for charcoal.

Wood pinkish brown throughout; straight-grained; fine- or moderately fine-textured; moderately heavy and hard; liable to check in drying. Growth rings indistinct or faintly visible. Parenchyma in numerous, evenly spaced, continuous, concentric bands. Pores of small or medium size; rather few, well distributed; solitary, also in small multiples or radial rows; open. Vessel lines fine, but visible. Rays finer than parenchyma lines; indistinct without lens on cross and tangential sections; sometimes distinct on radial surface.

Loreto: Pró, near Pebas, *1984.*

8. DIALIUM L.

Medium-sized or tall trees, usually with smooth bark which, when cut, exudes a reddish brown resin. Leaves once-pinnate. Calyx lobes open in bud; stamens numerous. Fruit globose or ovoid, smooth, not opening; the pulp surrounding the seeds is edible. Timber is esteemed for house posts.

Sapwood yellowish or pale brown, with light or dark gray streaks; heartwood slightly darker brown. Wood odorless and tasteless; fairly lustrous; coarse-textured; heavy or very heavy and durable; not very easy to work and holds its place well. Parenchyma in numerous, distinct, tangential lines, forming network with the rays. Pores large; fairly numerous and diffuse; solitary, infrequently in small radial multiples; often filled with dark gum or lustrous tyloses. Rays fairly broad and of about the same thickness as parenchyma lines on cross section; indistinct on other surfaces. Ripple marks present; all elements storied; number per inch length, up to 100.

Intervascular pits screwhead type. Rays homogeneous; sometimes uniseriate or biseriate in part, or up to 3 cells wide.

FIG. 16. "Huitillo," *Dialium* sp., near Yurimaguas, lower Huallaga.

Dialium acuminatum Spruce, ined. *Huitillo.*

Tree, frequently 60 to 70 feet or more in height. Crown spreading. Trunk moderately straight, cylindrical, 12 to 15 inches in diameter, and clear of limbs up to three-fourths the entire height. Bark grayish or reddish brown; secretes a small quantity of insipid reddish brown resin when cut. Flowers small, white. Fruit dark brown when mature, pulp light brown; August–September.—Of limited distri-

bution, but rather common along the banks of the Morona, a small stream near Iquitos (alt. 400 ft.). Timber is esteemed for house posts and purposes requiring resistance to dampness.

Sapwood yellowish or pinkish brown; heartwood reddish, not sharply defined. Wood odorless and tasteless; straight-grained or fairly so; medium- or coarse-textured; heavy, rather brittle, but firm and compact; fairly easy to work and holds its place well when finished. Growth rings faintly visible at times on account of slight variation in abundance of parenchyma. Parenchyma in numerous, fine, but distinct, tangential or concentric lines forming a network with the rays. Pores occasionally distinguishable to unaided eye; well distributed; solitary and oval in outline, less frequently in radial multiples of 2–3, rarely more, seldom tangentially disposed; open or filled with dark gum. Vessel lines vary in length and of same color as background. Rays finer than parenchyma lines or fairly broad on cross section; sometimes visible on tangential. Ripple marks present; all elements storied; number per inch length, 80–100.

Loreto: near Iquitos, *3699;* upper Nanay, *1181*(?).

9. HYMENAEA L.

Hymenaea palustris Ducke, Archiv. Jard. Bot. Rio Janeiro 1: 24. 1916. *Azúcar-huayo.*

Forest tree, 60 to 120 feet tall. Crown almost flat. Trunk straight, columnar, about 25 inches in diameter, clear of limbs for more than two-thirds the height, and with small buttresses. Bark 0.5 to 1 inch thick, pinkish or dark brown, and with rather coarse lenticels; a pale yellow, resin-like gum exudes from the trunk when incised. Leaflets 2. Flowers large, in terminal panicles. Pods smooth, subovoid, compressed; the brown bean-like seeds imbedded in a mealy, sweet, edible pulp, whence the Spanish-Quechua name ("azúcar"=sugar; "huayo"=fruit).—Limited in its distribution; in dense forest in humid loam or along banks of streams (alt. 550 ft.); reported also from the lower Brazilian Amazon. Although susceptible to termite attacks, the timber is of good quality and is employed to a limited extent for general construction.

Sapwood not distinctly defined, pale grayish brown with dark brown streaks; heartwood pale brown. Wood has no distinctive odor or taste; straight-grained; rather coarse-textured; heavy and hard; not easy to work; appears to be durable, although liable to check in drying. Growth rings occasionally visible owing to slight variation in abundance of elements. Parenchyma paratracheal,

aliform, and in short, tangential or continuous, unevenly spaced, concentric bands; visible to unaided eye. Pores of uneven size to fairly large; fairly numerous, well scattered; solitary or in radial multiples of 2–4; mostly open. Vessel lines rather prominent, of darker color than adjacent elements; usually filled with pale grayish or brown deposits. Rays fairly broad and sometimes distinguishable without lens on cross section; discernible also without lens on moistened tangential and radial surfaces. Vertical canals, gummosis type, present.

Rays homogeneous; uni- or biseriate. Strands of calcium oxalate common.

Loreto: San Antonio, upper Itaya, *3453*.

10. MACROLOBIUM Schreb.

Forest trees, from 50 to 60 feet in height with small, white flowers. Timber is not used locally except for fuel.

Sapwood pinkish brown; heartwood reddish or dark brown. Wood odorless and tasteless; of medium texture; medium density; inclined to be fibrous, but easy to cut. Parenchyma paratracheal, sometimes aliform or terminal. Pores of medium size; fairly numerous and well scattered; solitary, infrequently in small radial multiples; often filled with black gum or grayish white calcium. Rays fine, numerous, and closely spaced on cross section; indistinct on tangential; slightly darker than background and visible, but not distinct, on radial surface; uniseriate. Vertical canals, of the gummosis type, present.

Macrolobium acaciaefolium Benth. in Mart. Fl. Bras. 15, pt. 2: 224. 1870. *Pashaco, Pashaquilla.*

Tree, at times attaining a height of 50 feet. Crown spreading. Trunk erect, moderately round, 14 inches in diameter, and unbranched for 5 feet. Bark 0.75 inch thick, dark brown; inner bark purplish brown. Flowers small, corolla white with violet margin. Fruit compressed; July.—Not common; in dense forest and occasionally along margin of clearings (alt. 380 ft.); reported also from the Rio Negro, upper Brazilian Amazon, and British Guiana. Wood is employed mostly for fuel.

Sapwood pale brown and well defined; heartwood reddish or dark brown. Wood odorless and tasteless; straight-grained; medium- or rather coarse-textured; of medium weight, firm, and strong; easy to work, takes a smooth, fairly lustrous finish; subject

to stain. Growth rings faintly visible. Parenchyma surrounding the pores, aliform, confluent, or in more or less continuous, concentric lines which appear to indicate growth rings. Pores visible to unaided eye; not numerous, evenly scattered; solitary or less frequently in radial multiples of 2; open or filled with calcium or black gum deposits. Vessel lines rather coarse and readily distinguishable on account of parenchyma sheaths; yellowish white deposits frequently present. Rays numerous and closely spaced; discernible only with lens on cross and tangential surfaces; slightly darker-colored than adjacent elements and barely at limit of vision on radial surface.

Loreto: Caballo-cocha, *2420*.

Macrolobium taxifolium Spruce ex Benth. in Mart. Fl. Bras. 15, pt. 2: 224. 1870. *Aripari.*

Tree, about 60 feet in height. Crown flat. Trunk erect, columnar, tapering to the summit, 28 inches in diameter, and unbranched for from 25 to 30 feet. Bark reddish or dark chocolate brown, with small lenticels; sometimes used for binding balata blocks and to tie balsa rafts. Flowers small, white; May–June.—Not common; in humid areas in dense forest (alt. 600 ft.). Wood has no local application.

Sapwood yellowish white when fresh, darkening on exposure to pinkish brown, not sharply defined; heartwood dark pinkish brown. Wood straight-grained; medium- or rather coarse-textured; light, but firm; easy to work; takes a smooth, lustrous finish; checks in drying. Pores mostly solitary; smaller than in *M. acaciaefolium.*

Loreto: upper Nanay, *1098*.

11. POEPPIGIA Presl

Poeppigia procera Presl, Symb. Bot. 1: 16. 1832. *Cedro-pashaco.*

Tree, up to 90 feet in height. Crown flat. Trunk straight or moderately so, round, 16 inches in diameter, with low buttresses, and unbranched for one-third the entire height. Bark yellowish or pinkish brown, very thin, rough. Flowers paniculate, yellow, and showy; January–February. Fruit flat, thin, and narrowly winged. —Fairly common in the upland (alt. 1,500 ft.); in fairly dense forest. The durable heartwood is much esteemed for beams for house construction.

Sapwood about 2 inches thick, almost white; heartwood pinkish or pale chocolate brown, well defined. Wood odorless and taste-

less; straight-grained; medium-textured; of medium weight or rather heavy, strong, and tenacious; not difficult to work, takes a smooth, fairly lustrous polish, and holds its place well when finished. Growth rings present owing to alinement of elements. Parenchyma in closely or unevenly spaced, short, broken, tangential lines, sometimes in fine, fairly continuous, concentric lines, also terminal. Pores of medium size or fairly large; not very numerous and fairly well distributed; solitary or more often in radial multiples of 2–3; infrequently filled with calcium. Vessel lines appear as fine scratches of same color as background, at limit of vision. Rays numerous, fairly fine, closely spaced, and distinguishable only with lens on cross section; indistinct on tangential; lighter-colored than background and barely discernible when held to proper light on radial surface. Ripple marks present; all elements storied; number per inch length, about 70.

San Martín: near Tarapoto, *5817*.

12. SCHIZOLOBIUM Vog.

Schizolobium excelsum Vog., var. **amazonicum** Ducke(?), ined. *Pashaco.*

Tall, handsome tree, up to 100 or 120 feet in height, especially conspicuous in the forest when in blossom, on account of the profusion of brightly colored flowers. Crown flat. Trunk erect, cylindrical, 27 inches or more in diameter above the large buttresses, and clear of branches for 70 feet. Bark grayish or pinkish brown, and fairly smooth; inner bark fibrous. Leaves large and bipinnate. Flowers large, bright yellow, showy, in long-panicled racemes. Pods flat and thin.—Widely scattered in the lowland, but nowhere abundant (alt. 400 ft.).

Wood oatmeal-colored or almost white with slaty gray streaks caused by stain; odorless and tasteless; straight-grained; coarse-textured; light and fairly soft, but strong; requires a sharp knife to cut smoothly across the grain, inclined to saw woolly, and holds its place well when finished. Growth rings absent or poorly defined. Parenchyma surrounding the pores; at limit of vision. Pores fairly large; not numerous, diffuse; solitary, less frequently in radial multiples of 2–3, seldom diagonally or tangentially disposed; open or occasionally filled with black gum. Vessel lines coarse, of darker color than background, often filled with grayish white calcium and dark brown or black gum. Rays barely discernible without lens on cross section; distinguishable only with lens on tangential; of lighter color than background and sometimes distinguishable to

unaided eye on radial surface when held to proper light. Pith light brown, with specks of reddish or dark brown gum.

Loreto: lower Nanay, *705*.

13. SCLEROLOBIUM Vog.

Medium-sized trees, 45 or 50 feet tall. The durable timber is used in the vicinity of Tarapoto and Lamas for house posts and general carpentry.

Sapwood pinkish or pale brown; heartwood darker pinkish or reddish brown. Wood odorless and tasteless; rather coarse-textured; of medium weight to very heavy and strong; not difficult to work and takes a fairly lustrous polish; checks in drying. Parenchyma paratracheal. Pores of medium size to large; moderately numerous, diffuse- or ring-porous; solitary or in small radial multiples, seldom in small clusters; open. Rays fine, numerous, and closely spaced on cross section; indistinct on tangential; sometimes barely discernible without lens on radial surface.

Sclerolobium paniculatum Vog. Linnaea 11: 397. 1837. *Ucsha-quiro.*

Uncommon tree, about 45 feet in height. Crown spreading. Trunk straight, round, 7 inches or more in diameter, and unbranched for 15 feet. Bark reddish or dark brown, about 0.25 inch thick, and fairly smooth.—In fairly dense forest (alt. 1,500 ft.). Timber is used in the vicinity of Tarapoto for house posts and in the construction of huts.

Sapwood not sharply defined, pale pinkish with darker brown veining of vessel lines; heartwood pinkish brown with a grayish tinge. Wood has no distinctive odor or taste; straight-grained; rather coarse-textured; of medium weight, rather tough, and strong; slightly fibrous, not difficult to work, and holds its place fairly well; probably durable. Growth rings absent or poorly defined. Parenchyma surrounding the pores; not very distinct with lens. Pores of medium size and at limit of vision; not numerous, well scattered; solitary or in radial multiples of 2–4; open. Vessel lines coarse and readily distinguishable against the lighter-colored background. Rays numerous and moderately fine on cross section; discernible with lens on cross and radial surfaces; indistinct on tangential section.

San Martín: Tarapoto, *5701*.

Sclerolobium Uleanum Harms, Verh. Bot. Ver. Brandenb. 48: 168. 1907. *Ucsha-quiro.*

Medium-sized tree, up to 50 feet or more in height. Crown spreading. Trunk straight, round, 13 inches in diameter, and free of limbs for 18 feet. Bark reddish or dark brown, fairly smooth or with few, coarse ridges. Flowers small, yellow; January–February. —Not common; among low trees and shrubs of second growth (alt. 1,600 ft.). Timber is used by the natives of Lamas for house posts and rough carpentry.

Sapwood pale pinkish brown; heartwood reddish brown, thin. Wood odorless and tasteless; moderately straight-grained; medium-textured or fairly so; very heavy, hard, and compact; not easy to work, takes a fairly lustrous finish, and holds its place well; durable. Growth rings present or poorly defined. Parenchyma surrounding the pores; readily discernible with lens. Pores of medium size; not very numerous, inclined at times to be crowded; solitary, less frequently in radial multiples of 2–3, infrequently diagonally disposed or in small clusters; open or closed. Vessel lines moderately fine, but visible without lens. Rays barely at limit of vision on radial surface when held to proper light.

San Martín: Lamas, *6467*.

14. **SWARTZIA** Schreb.

Tall shrubs or small trees. Leaves once-pinnate; leaflets 1 or few, entire. Flowers large, white or yellow, showy, in short or long racemes; stamens numerous. Pods long-beaked. Some of the timbers are used for house posts and for rollers for crushing sugar cane.

Wood white, yellowish, pinkish gray, or grayish brown, often with purplish streaks; fine- or moderately fine-textured; light to heavy and brittle or tenacious; not difficult to work and takes a smooth polish; durable. Parenchyma paratracheal, aliform, and in numerous, concentric bands or lines, often uniting the pores, also terminal; sometimes distinct. Pores of small or medium size; fairly numerous or numerous; diffuse- or inclined to ring-porous; solitary, less often in small multiples, seldom in small clusters. Rays fine and numerous on cross section; indistinct on other surfaces; homogeneous, with a tendency to heterogeneous; 1–3 cells wide. Ripple marks present and distinct; all elements storied; number per inch length, 85–100.

Swartzia amplifolia Harms, Notizbl. Bot. Gart. Berlin 9: 970. 1926. *Icoje*.

Tree, 15 to 30 feet in height. Crown conical or spreading. Trunk straight, round, up to 7 inches in diameter, and either branching a few feet from the base or undivided for three-fourths the entire height.

Bark light or dark brown with a grayish tinge, fairly smooth or with numerous small ridges, and exudes when cut a small amount of insipid, reddish brown resin. Fruit brown, in clusters attached to trunk; September–October.—In open dry patches or along margin of forest (alt. 500 ft.).

Sapwood creamy yellow with violet or dark brown streaks, in some specimens turning to light grayish brown on exposure; heartwood brown, thin. Wood odorless and tasteless; straight-grained; medium-textured; of fairly light or medium weight; not difficult to work, takes a fairly smooth finish, and holds its place well. Growth rings present. Parenchyma paratracheal and in wavy, broken or continuous, concentric bands; lighter than background, and readily visible to unaided eye. Pores of medium size; not numerous, well scattered; solitary or in radial multiples of 2–3, seldom in small clusters; mostly open. Vessel lines long, moderately fine; often filled with dark brown gum. Rays very fine, numerous; visible only with lens on all surfaces. Ripple marks present; all elements storied; number per inch length, about 100.

Loreto: lower Huallaga, *4540*, *4965*.

Swartzia calophylla Poepp. & Endl. Nov. Gen. & Sp. 3: 61. *pl. 267*. 1845.

Shrub, from 4 to 15 feet tall. Bark dark purple, with numerous small ridges, and very thin. Fruit red when mature, with rounded, black seeds imbedded in a white, edible pulp.—Of limited distribution; in open dry patches in flood-free forest (alt. 550 ft.).

Sapwood distinctly demarcated, white or pale yellow; heartwood dark brown, thin. Wood has a slightly fetid odor when freshly cut; straight- or interlocked-grained; very fine-textured; heavy, hard, compact, and strong; not difficult to work, takes a smooth and fairly lustrous finish; durable. Growth rings present owing to variation in depth of color. Parenchyma in numerous, fine, wavy, broken or continuous, concentric lines and surrounding the pores; visible with lens. Pores small and indistinct even with lens. Vessel lines very fine and of same color as background. Rays very fine and barely discernible with lens on all surfaces.

Loreto: lower Huallaga, *4017*, *5295*.

Swartzia myrtifolia Smith, in Rees, Cycl. 34: No. 5. 1819; DC. Prodr. 2: 423. 1825. *Shatona blanca.*

Tree, 40 feet in height. Crown spreading and narrow. Trunk straight, somewhat compressed, 9 inches or more in diameter,

unbranched for one-fourth the entire height, and with low buttresses. Bark about 0.25 inch thick, light brown, fairly smooth or with shallow fissures.—In dense, flood-free forest (alt. 500 ft.); the species is reported also from the state of Bahia and near Rio de Janeiro, in Brazil, also in Colombia and Central America. The dense timber is esteemed in the vicinity of Yurimaguas for pillars and for rollers for crushing sugar cane.

Sapwood distinctly defined, creamy yellow to pale pinkish brown and subject to sapstain; heartwood dark chocolate brown and perishable. Wood odorless and tasteless; straight- or interwoven-grained; fine-textured; rather heavy, hard, and strong; not easy to work and takes a smooth polish; durable. Growth rings absent or poorly defined. Parenchyma surrounding the pores and in numerous, closely spaced, irregular, short, tangential lines uniting the pores, sometimes in continuous, concentric lines, of lighter color than background, and visible without lens. Pores small; not very numerous, well scattered; solitary, less frequently in small radial or diagonal multiples, seldom in small clusters. Vessel lines very fine and barely at limit of vision. Rays numerous, very fine, closely spaced, lighter-colored than background on cross section; distinguishable only with lens on cross and radial surfaces.

Loreto: Puerto Arturo, lower Huallaga, *5313*.

Swartzia pendula Spruce ex Benth. in Mart. Fl. Bras. 15, pt. 2: 19. 1870. *Itauba, Nina-caspi.*

Small glabrous tree, up to 18 feet in height. Crown open and branches pendent. Trunk straight or contorted, round, slender, and unbranched for from 1 to 10 feet. Bark greenish or light brown to dark purplish or almost black, fairly smooth or with numerous small fissures. Fruit bright yellow, turning red at maturity; seeds large, black.—Fairly common; usually along banks of streams (alt. 380–1,400 ft.).

Sapwood variable in color from clear yellow to light brown with purplish streaks; heartwood purplish brown. Wood odorless and tasteless; straight- or interwoven-grained; fine-textured; moderately heavy to heavy, tough, and strong; not easy to work and takes a smooth polish; susceptible to insect attacks. Growth rings absent or present; when present visible owing to variation in abundance of parenchyma. Parenchyma in numerous or fairly numerous, fine, tangential, and broken or continuous, concentric lines; visible with lens. Pores minute or small; few and scattered. Vessel lines invisible or visible

without lens. Rays very fine, numerous or moderately so, and discernible with lens on cross section; sometimes distinguishable to aided eye on other surfaces. Ripple marks present, but not distinct.

Loreto: upper Nanay, *694;* Pebas, *1875;* Caballo-cocha, *2175.* —San Martín: Tarapoto, *6550*(?).

Swartzia triphylla Willd. Sp. Pl. 2: 1220. 1800.

Small tree, from 16 to 28 feet or more tall. Crown flat or open. Trunk straight, round or slightly compressed, slender, and unbranched for more than half the height. Bark yellowish green to pinkish or very dark chocolate brown, fairly smooth or with numerous small ridges, and thin. Flowers small, yellow; July–August. Fruit ovoid or round, small.—Widely distributed in the lowland, but nowhere common; in open patches in fairly dense, flood-free forest (alt. 400 ft.).

Sapwood almost white or pale yellow, in some specimens with pale brown or grayish streaks; heartwood dark brown, thin. Wood odorless and tasteless; straight- or interlocked-grained; fine-textured; moderately heavy to heavy and tenacious; inclined to be fibrous, not easy to work, and takes a smooth finish; probably durable. Growth rings present. Parenchyma visible to unaided eye. Pores small or fairly small; not numerous, well scattered; solitary or in radial multiples of 2–3, seldom in diagonal pairs; open or closed. Vessel lines fine and of same color as background, but discernible without lens. Rays very fine and barely distinguishable with lens on cross section; indistinct or faintly discernible to aided eye on other surfaces. Ripple marks present; number per inch length, about 85.

Loreto: La Victoria, *3174;* upper Itaya, *3516;* near Iquitos, *3768, 8007;* lower Huallaga, *3873.*

15. TACHIGALIA Aubl.

Tachigalia paniculata Aubl. Pl. Guian. 1: 372. *pl. 143.* 1775. *Caracha-caspi, Erpes.*

Tall, forest tree, up to 120 feet in height. Crown dense, round. Trunk straight, columnar, up to 28 inches or more in diameter, unbranched for half the entire height, and with strong buttresses. Bark reddish brown and scaly; inner bark slightly fibrous. Tips of branchlets yellow and twigs covered with numerous gray scales. Pod 1-seeded; seeds black when mature; fruiting in July–August. —Uncommon; in dense growth free from periodical floods (alt.

450 ft.). The durable timber is used for posts in the construction of huts.

Sapwood fairly well defined, lustrous yellowish brown; heartwood dark brown. Wood odorless and tasteless; straight-grained; medium- or fairly coarse-textured; heavy, hard, and tough; takes a smooth finish; checks in drying; resistant to insect attacks and stain. Growth rings absent. Parenchyma surrounding the pores; discernible without lens. Pores of medium size or sometimes fairly large; not numerous, well distributed; solitary or less frequently in radial or diagonal multiples of 2–5; often filled with pale yellow or grayish white deposits. Vessel lines rather coarse and prominent. Rays fairly numerous, very fine, closely and evenly spaced; distinguishable with lens on cross and tangential sections; indistinct or sometimes discernible without lens on radial surface when held to proper light.

Loreto: Palta-cocha, middle Nanay, *3192*.

III. PAPILIONATAE (Fabaceae)

Trees, shrubs, or herbs, with simple or compound leaves, but never bipinnate. Flowers various, mostly of moderate size and brightly colored, sometimes very small and inconspicuous, solitary or in spikes, racemes, or heads, rarely cymose; uppermost petals in bud outside the others; stamens frequently united into a sheath.

1. DALBERGIA L. f.

Dalbergia inundata Benth. Journ. Linn. Soc. 4: Suppl. 49. 1860; Mart. Fl. Bras. 15, pt. 1: 227. 1862. *Meradiu.*

Shrub, 12 feet tall. Bark thin, pale grayish brown, and fairly smooth; inner bark coarsely fibrous. Leaflets alternate. Flowers small, with purplish petals; April–May.—Fairly common along the banks of lower Itaya and Nanay rivers (alt. 400 ft.); previously reported in Brazil near Santarem on the Tapajos, along the Negro, Panure, and Uaupes rivers.

Sapwood lustrous pale pinkish brown with fine, darker brown streaks; heartwood dark reddish brown or almost black, thin. Wood light in weight; straight- or roey-grained; medium- or rather coarse-textured; easy to work and takes a moderately smooth finish. Growth rings present owing to some variation in color. Parenchyma in fairly numerous, wavy, evenly and rather closely spaced, concentric lines, forming a network with the rays. Pores of medium size or large and prominent; not numerous and well distributed; solitary or

less frequently in radial, seldom diagonal, multiples of 2–4; open. Vessel lines long, coarse, and often with brown, gummy deposit. Rays fairly fine on cross section; indistinct on tangential; fairly distinct or indistinct on radial surface; homogeneous; uniseriate or biseriate. Ripple marks present; all elements storied; number of marks per inch length, about 120.

Loreto: lower Nanay, *525*.

2. ERYTHRINA L.

Trees or large shrubs, often armed with stout spines. Leaves have 3 large leaflets. Flowers large and showy, and arranged in racemes; the standard petal is either much longer or else much broader than the other petals. Pods linear, scarcely or not at all compressed, and more or less constricted between the scarlet seeds.

Wood oatmeal-colored, occasionally with purplish or reddish streaks; odorless and tasteless; very coarse-textured; light and soft; requires a sharp knife to cut smoothly across grain and saws woolly; perishable. Parenchyma paratracheal and in numerous, broad, distinct, tangential bands, forming a network with the rays. Pores large; few, ring-porous or inclined to diffuse-porous; solitary or seldom in small radial multiples; mostly open. Rays broad, widely spaced, and distinct on cross section; sometimes readily distinguishable without lens on tangential; distinct on radial surface; homogeneous; up to 13 cells wide. Ripple marks present; only parenchyma strands and vessel segments storied; number per inch length, 100–140. Strands of calcium oxalate common.

Erythrina esculenta Sprague(?), Bull. Herb. Boiss. II. 5: 1167. 1905. *Amasisa*.

Handsome, well-formed tree, approximately 60 feet high, with attractive red flowers and edible fruit. Crown spreading. Trunk erect, columnar, 14 inches or more in diameter, and free of limbs up to 21 feet; trunk and branches armed with short spines. Bark grayish or purplish brown; an infusion prepared by boiling the bark in water is reputed to be beneficial for treating skin ailments.

Wood yellowish white or pinkish brown; odorless and tasteless; coarse-textured; very light, soft, and perishable; requires a sharp knife to cut smoothly across grain; should be suitable for paper pulp. Rays faintly discernible on all surfaces. Pith large, reddish brown.

Loreto: Yurimaguas, *4178*.

Erythrina glauca Willd. Sp. Pl. 3: 915. 1803; Ges. Naturf. Freunde Neue Schr. 3: 428. 1801. *Amasisa.*

Medium-sized or fairly tall tree, from 55 to 70 feet or more in height. Crown dense, round. Trunk erect, cylindrical or moderately so, 35 inches in diameter, clear of limbs for almost one-half the height, and armed with strong, stout spines. Bark pinkish or reddish brown, with coarse, sinuous fissures; bark and sapwood exude a slightly sweet, light brown resin reputed to be efficacious for skin irritations. Leaflets assume a vertical position after sunset. Flowers orange-yellow, hence the local Quechua name ("ama"=yellow; "sisa"=flower).—Common in the lower Peruvian Amazon region (alt. 400 ft.); in open patches, in scant forest, often in the vicinity of streams; said to be abundant in the eastern region of the Brazilian Amazon, also in the Guianas and Central America. Timber is not used except to a limited extent for fuel.

Sapwood pale yellow or light brown, often with extensive grayish areas; heartwood dark brown or almost black, perishable. Wood odorless and tasteless; straight-grained; rather coarse-textured; moderately light in weight, but firm; easy to cut, takes a smooth finish; liable to check in drying; not durable. Growth rings indistinct. Parenchyma paratracheal and in numerous, evenly spaced, continuous, concentric bands. Vessel lines of variable length and darker than background. Rays prominent on all surfaces; heterogeneous.

Loreto: Pebas, *1614, 1960;* Caballo-cocha, *2314;* La Victoria, *3142.*

Erythrina Ulei Harms, Verh. Bot. Ver. Brandenb. 48: 172. 1907. *Amasisa.*

Attractive tree, from 40 to 55 feet tall. Crown spreading. Trunk straight, round, 13 inches or more in diameter, and free of branches for more than half the height. Bark brown; inner bark separates into long, coarse flakes. Flowers pale pink or bright red and handsome; October–November.—Fairly common in the lower Huallaga (alt. 450 ft.); in thickets, old clearings, or along banks of streams.

Wood pale yellow with dark streaks or pale brown areas; light, but firm and strong. Parenchyma visible, but not prominent, as numerous, short, tangential bands. Rays barely at limit of vision on cross section; of same color as background, but discernible without lens on radial surface.

Loreto: Yurimaguas, *4767.*

3. LONCHOCARPUS HBK.

Trees or large shrubs, sometimes scandent. Leaves pinnate, the few or numerous leaflets opposite. Flowers large and showy, pink or purple, in panicled racemes. Fruit flat, usually thin, oblong or linear, indehiscent.

Wood grayish white or yellowish, subject to stain in drying; odorless and tasteless; medium- to coarse-textured; heavy, tenacious, and strong; not difficult to work; durable. Parenchyma in broad, irregularly spaced, concentric bands, forming a network with the rays. Pores of medium size to large; few or fairly numerous, diffuse- or ring-porous; solitary or in small radial or tangential multiples; open. Rays fine to broad on cross section; sometimes faintly distinguishable on tangential; fairly distinct on radial surface. Ripple marks present; all elements storied; number per inch length, up to 110.

Vessel-ray pits elongated, simple. Rays homogeneous; 2–5 cells wide. Strands of calcium oxalate common.

Lonchocarpus confertiflorus Benth. Journ. Linn. Soc. 4: Suppl. 96. 1860.

Tree, 80 feet in height. Crown round. Trunk erect, columnar, 16 to 20 inches in diameter, with small buttresses, and unbranched up to 50 feet. Bark light gray or pinkish to chocolate brown, rough, and exudes when cut a small amount of viscid, bitter, reddish resin. Flowers pale violet; January–February.—Rare; in moderately dense forest (alt. 1,500 ft.). Wood not used locally except for fuel.

Wood yellowish brown when fresh, turning after long exposure to pale gray or grayish brown; odorless and tasteless; straight- or roey-grained; medium- or coarse-textured; of medium weight, firm, and strong; fairly easy to cut, takes a moderately smooth and lustrous finish; probably durable. Growth rings indistinct. Parenchyma surrounding the pores and in broad, wavy, evenly spaced, concentric bands. Pores at limit of vision; not numerous, uniformly distributed; solitary or in radial, infrequently tangential, multiples of 2–3; open. Vessel lines short or long, fairly prominent on account of parenchyma sheaths and dark contents. Rays fine and visible only with lens on cross and tangential sections; faintly discernible without lens and slightly darker than background on radial surface. Ripple marks present; all elements storied; number per inch length, approximately 110.

San Martín: Tarapoto, *6711*.

Lonchocarpus Nicou (Aubl.) DC. Prodr. 2: 261. 1825; Journ. Wash. Acad. Sci. 20: 75–79. 1930. *Barbasco, Barbasco legítimo, Cube-barbasco, Cube, Coñapi, Huasca-barbasco, Pacai.*

Shrub, up to about 12 feet tall, with a stem about 3 inches in diameter, becoming scandent with age, the stem climbing upon adjacent shrubs and trees up to a height of 40 feet or more (one specimen observed measured 60 feet in length). Bark dark red or chocolate brown, fairly smooth, often with lighter brown lenticels; inner bark fibrous.—Scattered throughout the lowland and upland (up to an alt. of 2,000 ft. or more), and sometimes cultivated in small clearings, *chácaras.* The crushed roots yield a pulp resembling buttermilk in appearance, which is used extensively by the Indians and others as fish poison. Chemical analysis of the pulp indicates that it contains rotenone, a substance of value in the manufacture of insecticides. (For further notes see page 53.)

Sapwood pale yellow with dark grayish areas; heartwood dark brown, thin. Wood when fresh has a pleasant odor and is slightly bitter; straight- or irregular-grained; rather coarse-textured; of light or medium weight, but firm. Growth rings absent or indistinct. Parenchyma conspicuous; in broad, irregularly and closely spaced, broken or continuous, concentric bands, producing a hoary effect on cross section. Pores at limit of vision; not numerous and evenly scattered; solitary, infrequently in small radial or tangential multiples; often filled with dark gum. Vessel lines short and readily distinguishable owing to dark contents; white deposits also frequently present. Rays discernible, but not prominent, to unaided eye on cross section; indistinct on other surfaces.

Loreto: near Iquitos, *3740;* lower Huallaga, *4143, 4841.*—San Martín: Tarapoto, *6080.*

4. MACHAERIUM Pers.

Machaerium sp. Slender shrub, 3 feet or more tall. Bark grayish brown and fairly smooth. Wood when cut secretes an abundance of bitter, reddish brown resin. Leaflets alternate. Flowers small, pinkish, in racemes. Fruit samara-like, compressed; April–May.—Uncommon; among shrubs near bank of Amazon (alt. 400 ft.).

Sapwood yellowish, pinkish, or pale brown, and distinctly demarcated; heartwood reddish or purplish brown. Parenchyma in fine, wavy, broken, concentric bands. Pores of small or medium size and at limit of vision; few and scattered; solitary or in small

radial multiples. Rays numerous, fine; barely discernible with lens on cross and radial sections.

Loreto: lower Nanay, *563*.

5. MYROXYLON L. f.

Myroxylon balsamum (L.) Harms, Notizbl. Bot. Gart. Berlin 5: 94. 1908. *Estoraque.*

Tall, handsome tree, from 80 to 180 feet in height. Crown flat. Trunk straight, columnar, 14 to 36 inches or more in diameter, and clear of limbs for one-half to three-fourths the entire height. Bark dark brown, with coarse scales. By tapping the trunk there is obtained an aromatic, yellowish brown or translucent oleoresin, the balsam of Peru, an official drug of the United States Pharmacopoeia and reputed to be used in domestic medicine, also for the manufacture of poison applied on blowgun darts.—Fairly common; forming the upper story in dense, flood-free forest (alt. 380–1,800 ft.). The dense, durable heartwood is much esteemed locally for rollers for crushing sugar cane, also for house posts, general carpentry, and other uses requiring durability, strength, and resistance to moisture.

Sapwood about 4 inches thick at base of trunk, yellow when fresh, creamy yellow or light brown when dried, with grayish cast caused by sapstain; heartwood reddish or purplish brown and darkening somewhat on exposure. Wood when fresh has a pronounced spicy odor, but is tasteless; straight- or roey-grained; medium- or coarse-textured; hard and heavy; not easy to work and takes a smooth polish; liable to check in drying and sapwood susceptible to insects. Growth rings present owing to narrow, poreless zones. Parenchyma surrounding the pores and sometimes in indistinct, short, tangential lines. Pores rather small or of medium size to large and distinct owing to parenchyma sheaths; numerous and well distributed; solitary or in small radial multiples of 2–3; open or closed. Vessel lines fine and inconspicuous; lustrous tyloses and localized black gum deposits sometimes present. Rays fine and barely visible without lens on cross section; indistinct or sometimes faintly discernible on tangential; barely visible to unaided eye on radial surface. Ripple marks present, very uniform and visible without lens; all elements storied; number per inch length, 80–120.

Loreto: Pebas, *1805;* near Yurimaguas, *4454* (specimen from log on forest floor); Santa Rosa, lower Huallaga, *4882*.—San Martín: Río Mayo, middle Huallaga, *6230*.

6. PTEROCARPUS L.

Pterocarpus Ulei Harms, Bot. Jahrb. 37: 346. 1906; Verh. Bot. Ver. Brandenb. 48: 171. 1907.

Tall, forest tree, at times attaining a height of 100 feet. Crown spreading. Trunk bent, and appressed, especially near the base, 14 or more inches in diameter, clear of limbs for 21 feet, and sometimes unbranched above the first branch for about 80 feet. Bark yellowish or dark reddish brown and scaly.—Fairly common in the lower Peruvian Amazon region; in flood-free areas (alt. 380 ft.).

Sapwood pale yellow, darkening slightly on exposure, and with extensive grayish areas; heartwood dark reddish brown, perishable. Wood tasteless, but has a slightly fetid odor; straight-grained; medium- to rather coarse-textured; fairly light in weight, but firm and strong; easy to cut and takes a dull finish; susceptible to insect attacks and to stain. Growth rings absent or indistinct. Parenchyma surrounding the pores and in numerous, broken or fairly continuous, irregular, wavy, tangential or diagonal bands uniting the pores. Pores visible to unaided eye; not numerous, well scattered; solitary or in radial multiples of up to 4, seldom in small clusters; open or filled with calcium or black gum. Vessel lines visible, but not distinct. Rays numerous, fine, and closely spaced on cross section; barely visible with lens on other surfaces. Ripple marks present; all elements storied; number per inch length, about 110.

Loreto: La Victoria, *2821;* herbarium material collected also at Pebas.

7. TEPHROSIA Pers.

Tephrosia toxicaria (L.) Pers. Syn. Pl. 2: 329. 1807.

Slender, fast-growing shrub, 4 or 5 feet tall. Bark light brown, smooth. Petals yellowish green, pale purple within at base, and filaments pale yellow.—Common throughout the lowland; sometimes cultivated for its leaves and roots, which are crushed and used as fish poison; reported also from the Pichis Trail (alt. 400–4,000 ft.).

Wood white or light brown; odorless and tasteless; straight-grained; fine-textured. Growth rings absent. Parenchyma indistinct. Pores small; not numerous, well scattered; solitary or in small radial multiples. Vessel lines very fine, slightly darker than background, and barely visible without lens on moistened surface. Rays fine, numerous, and discernible only with lens on cross section; indistinct on other surfaces.

Loreto: lower Nanay, *441;* herbarium material collected also at Palta-cocha, middle Nanay, and at Santa Rosa, lower Huallaga.

ERYTHROXYLACEAE. Coca Family

1. ERYTHROXYLON L.

Glabrous shrubs or small trees. Leaves alternate, entire, thin, stalked, and stipulate. Flowers small, solitary or fasciculate in the leaf axils. Fruit a small drupe.

Sapwood pale brown, occasionally yellowish, usually with a grayish or pinkish tinge or streaked; heartwood reddish brown. Wood fine- or medium-textured; heavy or fairly heavy; easy to work; sometimes liable to be damaged by insects, but mostly durable. Pores small or very small; very numerous and well distributed; solitary or less frequently in radial multiples; often closed. Parenchyma paratracheal, confluent, and in numerous, fine, tangential lines, producing a hoary effect when seen under lens. Rays fine or very fine on cross section; usually invisible on tangential; occasionally fairly distinct on radial surface.

Vessel perforations mostly simple to scalariform; intervascular pits numerous and small; vessel-ray pits either elliptical or much elongated and simple to small, circular, and half-bordered. Rays decidedly heterogeneous; mostly 1–2, sometimes 3, cells wide, the cells small and gummy. Crystals of calcium oxalate common in parenchyma strands. Wood fibers have thick walls and the pits are indistinctly bordered.

The best-known and most important member of this genus is *Erythroxylon Coca* Lam., a shrub, up to 6 or 8 feet high, growing in wooded regions along the eastern slopes of the Andes where it is often cultivated for its leaves, commercially important as the source of cocaine. Beginning in the low forest, the shrubs are to be seen here and there in clearings up to an altitude of 5,000 or 6,000 feet. The leaves are bright green, thin, opaque, and acuminate. The flowers are borne in clusters on short stalks; the corolla is yellowish white. The drupe is pinkish red when mature. The leaves have the property when masticated of imparting a remarkable sustaining power, due to the alkaloid, cocaine, present. Coca is to the Indian and mestizo laborers of the Andean highlands what betel is to the Hindu, or tobacco to the rest of mankind. In fact, the dried leaves sometimes take the place of currency. Not only is coca a narcotic and a sedative, but it is an absolute necessity to the many toiling

inhabitants who are addicted to its use. In the Peruvian Andes, the natives are able to travel for several days with little sleep and with practically no sustenance other than coca leaves and cassava. (For further notes on coca see page 52.)

Erythroxylon amplum Benth. in Hook. Lond. Journ. Bot. 2: 372. 1843.

Slender shrub, approximately 12 feet tall. Bark pale grayish, yellowish, or reddish brown. Leaflets fairly long-stalked, oblong-elliptic, short-acuminate, acute or obtuse at base, subcoriaceous, bluish gray beneath. Flowers axillary, short-pedicellate, with greenish white corolla; July–August.—Abundant in some localities in the lowland; in second growth (alt. 400 ft.).

Sapwood uniform pale pinkish brown; heartwood reddish brown, thin. Wood straight- or interwoven-grained; uniformly fine-textured; rather heavy and tenacious. Growth rings fairly distinct or readily visible owing to alinement of elements. Pores not numerous. Rays slightly more pronounced on cross section than in *E. Mamacova.*

Loreto: near Iquitos, *3759.*

Erythroxylon lucidum HBK. Nov. Gen. & Sp. 5: 179. 1822. *Murcuvarilla colorada.*

Tall, slender shrub or small tree, from 10 to 30 feet in height. Crown spreading. Trunk erect, round, and free of limbs up to half the height. Bark dark gray or chocolate brown, often with short, shallow, horizontal fissures. Leaves elliptic or elliptic-oblong, coriaceous, short-stalked, short-acuminate, acute at base. Flowers borne on the trunk, with yellowish white petals, white staminal filaments, and brown anthers. Drupe ovoid-oblong, green. Wood used for rafters in house construction.

Sapwood pale pinkish brown; heartwood brown, thin. Wood of medium weight to fairly heavy and tenacious; takes a smooth, lustrous finish; appears to be durable. Growth rings absent or poorly defined. Pores slightly larger than in *E. Mamacova.*

Loreto: Yurimaguas, *3796.*—San Martín: Tarapoto, *5865, 6668.*

Erythroxylon macrocnemium Mart. Abh. Akad. Muench. 3, pt. 2: 402. 1840.

Shrub, about 18 feet tall. Crown tapering. Trunk straight, round, and slender. Bark yellowish brown, fairly smooth or with

shallow, vertical ridges. Leaves short-petiolate, oblong or obovate-oblong, cuneate, subcoriaceous, short-acuminate at apex, obtuse at base. Flowers pale yellow, attached to trunk and branches; October. —Common in the lowland (alt. 400–600 ft.); in dry loam. Wood not used locally.

Sapwood indistinctly demarcated, light brown with a pale grayish tinge; heartwood dull brown. Growth rings indistinct in some specimens. Pores rather numerous, especially in sapwood. Lustrous tyloses common in vessels.

Loreto: Santa Ana, upper Nanay, *1230;* Recreo, *4149;* Fortaleza, lower Huallaga, *4356.*

Erythroxylon macrophyllum Cav. Diss. 8: 401. *pl. 227.* 1789. *Yutobanco.*

Small, forest tree, from 20 to 25 feet tall, but said to attain greater stature. Crown spreading. Trunk straight, round, 9 inches or more in diameter, and free of branches for two-thirds the height. Bark pinkish brown and fairly smooth. Leaves oblong or oblong-obovate, subleathery, acute at base, short-acuminate, costa rather prominent beneath. Flowers pale yellow. Drupe ovate; December–January.

Sapwood constitutes most of the wood, pale pinkish brown, occasionally with darker streaks; heartwood dull light to dark brown. Wood of medium weight. Pores fairly numerous; slightly larger than those of *E. Mamacova.* Rays faintly distinguishable to unaided eye on radial surface.

San Martín: Tarapoto, *6591.*

Erythroxylon Mamacova Mart. Abh. Akad. Muench. 3, pt. 2: 365. 1840. *Motelo-caspi.*

Small, forest tree, from 28 to 35 feet in height. Crown spreading. Trunk erect, cylindrical, 6 to 10 inches in diameter, and clear of limbs for 10 to 16 feet. Leaves oblong-elliptic, membranaceous, acuminate, acute at base. Drupe oblong, conical; October–December. —Confined to the foothills of the lower Huallaga (alt. 600 ft.).

Sapwood pale brown with long, slightly darker brown or grayish streaks; heartwood dull reddish brown, thin. Wood tasteless and odorless; straight-, roey-, or irregular-grained; uniformly fine-textured; moderately heavy, firm; easy to cut, takes a smooth finish; not durable. Growth rings visible owing to some variation in depth of color. Parenchyma indistinct. Pores minute or small, but discernible with lens; numerous; solitary or in small radial rows;

mostly open. Vessel lines fine and visible only to aided eye; lustrous deposits frequently present. Rays fine and barely distinguishable with lens on the cross section; indistinct on tangential and radial surfaces.

Loreto: Yurimaguas, *4639, 4664.*

Erythroxylon paraense Peyr. in Mart. Fl. Bras. 12, pt. 1: 164. 1878. *Catahua, Pucallaja.*

Tall shrub, or small, forest tree, occasionally attaining a height of 30 feet. Crown spreading. Trunk straight or bent, round or appressed, slender, and either branching from base or clear of limbs up to two-thirds the height. Bark 0.25 inch thick, grayish, yellowish, or reddish brown, with short, fine fissures and minute lenticels. Leaves elliptic, short-stalked, membranaceous, acute at apex, and costa prominent beneath. Flowers white or yellow; December–January.—Wood used for rafters in house construction.

Sapwood fairly well defined or indistinctly demarcated, pinkish brown, in some specimens with a grayish tinge; heartwood pale yellow when fresh, darkening on exposure to pale brown. Wood heavier and tougher than *E. Mamacova;* not resistant to insects. Pores fewer and slightly larger than in *E. Mamacova;* solitary or in radial multiples of 2–3, mostly open. Vessel lines distinguishable to unaided eye; often with grayish deposit. Rays barely visible without lens on radial surface.

San Martín: Tarapoto, *6319, 6325, 6614, 6672.*

Erythroxylon Shatona Macbr. Candollea 5: 371. 1934. *Shatona colorada.*

Slender, glabrous tree, seldom exceeding 30 feet in height. Crown spreading. Trunk straight, columnar, clear of limbs for 3 feet or so, not buttressed. Leaves ovate-elliptic, abruptly acute, short-stalked, coriaceous, lustrous deep green. Drupe oblong-elliptic; fruiting in January–February.—Common in dense forest near the estuary of the Río Mayo (alt. 1,500 ft.). Timber employed for rafters in the construction of houses and huts.

Sapwood indistinctly demarcated, pale yellowish brown with a greenish cast; heartwood dull brown. Wood moderately or decidedly heavy, hard, and compact; straight- or irregular-grained; uniformly fine-textured; takes a smooth finish; checks in drying. Growth rings visible owing to absence of parenchyma. Parenchyma paratracheal and in fine, slightly wavy, tangential or concentric

lines, more uniform than in the other species described. Pores minute or small; numerous. Rays barely distinguishable to aided eye on cross and tangential sections; faintly discernible without lens on radial section.

San Martín: Río Mayo, near Tarapoto, *6212*.

RUTACEAE. Rue Family

Trees, often armed with spines or prickles, and usually furnished with glands on the bark, leaves, and fruit. Leaves opposite or alternate, simple or compound, without stipules, and dotted with transparent oil glands. Flowers small or large, the inferior calyx with 3–5 lobes or sepals; petals 3–5; stamens as many or twice as many as the petals. Fruit of 1–5 or more free or united carpels, dry or fleshy. The best-known commercial timbers of the family are the satinwoods of Ceylon and the West Indies, while trees of the genus *Citrus* are cultivated extensively in tropical and subtropical regions for their fruits.

The Peruvian woods are white, yellowish, or pale brown; usually without distinctive odor or taste; fine- to medium-textured; rather light and soft to heavy, hard, and tenacious; easy to work and capable of taking a smooth polish. Growth rings usually distinct, due to terminal parenchyma, differences in density, or to abundance of pores. Parenchyma paratracheal, also in unevenly spaced concentric lines or fine bands, and terminal. Pores of small or medium size; few to numerous, diffuse- or ring-porous; solitary, in radial multiples or rows, seldom in small clusters; mostly open. Rays fine or moderately fine and numerous on cross section; inconspicuous on all surfaces. Vertical canals, gummosis type, are present in association with parenchyma in *Citrus* and *Zanthoxylum*.

Vessel perforations are typically simple; intervascular pits bordered, rather small, and numerous; vessel-parenchyma pits half-bordered. Rays usually homogeneous; 1–4 cells wide and few to 40 or more cells high. Wood fibers with simple or indistinctly bordered pits.

1. CITRUS L.

To this genus, the best known of the family, belong such edible fruits as the orange, lemon, lime, grapefruit, etc., all of which are natives of the Old World tropics and are now cultivated widely in tropical and subtropical regions. The wood of the various species enters the market in small quantity in the form of sticks under the

name of orange wood, which is used in the United States for manicure sets, small carved and turned articles, and novelties.

Wood white, yellowish, or pale brown; has no characteristic odor or taste; fine- or fairly fine-textured; of medium weight to moderately heavy and strong; fairly easy to work and takes a high polish. Parenchyma paratracheal, in confluent wings, and in concentric bands which appear to limit seasonal growth or at times may be crowded and run together. Pores of small or medium size; fairly numerous, well distributed; solitary, in radial multiples or rows, and seldom in small clusters. Rays fine or barely visible without lens on cross section; indistinct on tangential and radial surfaces. Ripple marks are absent. Vertical ducts, gummosis type, are of frequent occurrence.

Citrus aurantifolia (Christm.) Swingle, Journ. Wash. Acad. Sci. 3: 465. 1913. *Limón agrio.*

Small, armed tree, seldom exceeding 25 feet in height. Crown spreading. Trunk up to 14 inches in diameter and either branching from base or clear of limbs for 2 feet or more. Leaves ovate, acute or rounded at apex, and rounded at base. Flowers with white petals. Fruit dark green.—Often planted; in places appears to grow without cultivation.

Wood pale satiny yellow, occasionally with brown streaks; odorless and tasteless; straight- or interlocked-grained; uniformly fine-textured; moderately heavy to heavy, strong and compact; takes a smooth, lustrous finish; durable. Growth rings present owing to arrangement of elements. Parenchyma paratracheal and confluent. Pores small; numerous, well distributed; solitary or in radial multiples or rows of 2–4, sometimes tangentially disposed; mostly open. Vessel lines readily distinguishable as fine scratches of varying length and slightly darker than background; lustrous tyloses sometimes present. Rays barely discernible to unaided eye on cross and radial sections; distinguishable only with lens on tangential.

Loreto: lower Itaya, *177;* lower Nanay, *285, 471;* Pebas, *1800;* upper Itaya, *3268.*

Citrus Aurantium L. Sp. Pl. 782. 1753. *Naranjo, Naranja ácida.*

Small, armed tree, not more than 30 feet tall. Crown densely branched, round or conical. Trunk straight, fairly cylindrical, stout, and free of branches for 3 or 4 feet. Bark reddish or dark

brown with numerous yellowish ridges. Flowers white, fragrant; June–July. Fruit bitter to taste and is little used locally.—Sometimes cultivated in the lowland.

Loreto: Pebas, *1774*.

Citrus Limetta Risso, Ann. Mus. Par. 20: 195. *pl. 2, f. 1.* 1813. *Limón dulce.*

Tree, 20 to 30 feet in height, often planted in the lowland. Crown dense, round. Trunk straight, round, 10 to 13 inches in diameter, and branching from near the base; trunk and branches armed with short, stout spines. Bark yellowish or dark brown, with shallow fissures. Leaves ovate, glabrate, short-petiolate, rounded or acute at apex, rounded at base. Fruit about the size of an orange.

Sapwood satiny yellow or grayish white; heartwood dull light brown. Wood has a slightly unpleasant odor, but is tasteless; slightly coarser-textured than *C. aurantifolium;* moderately heavy to heavy.

Loreto: lower Nanay, *266;* La Victoria, *2933*.

Citrus medica L. Sp. Pl. 782. 1753. *Limón cidra.*

Shrub, about 15 feet tall. Bark thin, yellowish or purplish brown. Leaves alternate, distinctly serrate, elliptic or ovate, acute at apex and base, and midrib prominent beneath. Flowers large, pinkish, and with yellow stamens. Fruit about the size of a grapefruit and contains a scant pulp which is employed for making a beverage. The rind is used in confectionery.

Loreto: Iquitos, *1464*.—San Martín: San Roque, *7211*.

2. DICTYOLOMA A. Juss.

Dictyoloma peruvianum Planch. in Hook. Lond. Journ. Bot. 5: 583. 1846. *Huaman-samana.*

Unarmed shrub, from 7 to 9 feet tall. Bark greenish or yellowish brown. Leaves compound, pinnate; leaflets alternate, oblongate or elliptic, of a lighter green color beneath, mucronate at apex, acute or often oblique at base, pubescent above and below; the crushed leaves are used locally as a substitute for soap. Leaves and inflorescence confined to the summit. Fruiting in November–January.—Common; in sandy loam in pastures or thickets (alt. 600–1,400 ft.); reported also near La Merced, Department of Junín, and in the Department of Cajamarca (alt. 2,800 ft.).

Wood lustrous pale yellowish white; has a faintly pleasant odor and a slightly bitter taste when freshly cut; straight-grained; fairly

fine- or medium-textured; light or moderately light in weight. Growth rings poorly defined. Parenchyma paratracheal and terminal; not distinct. Pores fairly small or medium-sized; moderately numerous, inclined to ring-porous; solitary, but more often in radial multiples or rows of 2–5, seldom in small clusters; open. Vessel lines short, of same color as adjacent elements, and indistinct. Rays discernible only with lens on cross and radial surfaces; indistinct on tangential section.

Loreto: Yurimaguas, *4296*(?).—San Martín: Tarapoto, *5530*.

3. ERYTHROCHITON Nees & Mart.

Erythrochiton brasiliense Nees Mart. Nov. Act. Nat. Cur. 11: 170. *pl. 25*. 1823.

Small tree or shrub, from 10 to 15 feet tall, with leaves and inflorescence confined to the summit. Trunk erect or inclined, cylindrical, slender, and simple. Bark 0.25 inch thick, grayish brown, fairly smooth; inner bark fibrous. Leaves lustrous green. Calyx scarlet and corolla white; flowering in February.—Uncommon; in sandy loam among shrubs and low trees (alt. 1,500 ft.). Wood has no local application except for fuel.

Wood white throughout when fresh, turning to light or reddish brown on exposure, and with dark or almost black streaks; odorless, but has a slightly astringent taste; interlocked-grained; fairly fine-textured; of medium weight, compact, and tough; inclined to be splintery, moderately easy to cut, and capable of taking a smooth finish. Growth rings present owing to arrangement of elements. Parenchyma abundantly developed; paratracheal and in fine, closely or widely spaced, concentric lines or bands, sometimes terminal. Pores minute or small; numerous, inclined to be in concentric bands or zones; solitary or in small radial multiples or rows; mostly closed. Vessel lines of same color or slightly darker than background and distinguishable only with lens. Rays wavy, fine or fairly fine, and faintly visible to unaided eye on cross section; indistinct on tangential and radial surfaces.

San Martín: Rumisapa, near Tarapoto, *6761*.

4. ZANTHOXYLUM L.

Shrubs or trees, the trunk and branches often armed with spines. Leaves alternate, rarely unifoliolate, deciduous or persistent; the leaflets entire or crenulate, gland-dotted. Flowers small, greenish or

yellowish. Fruit dry, composed of 1–5 small pods containing shining black seeds.

Sapwood whitish, yellowish, or pale brown; heartwood light to dark brown. Wood odorless and tasteless; medium-textured; of light weight to heavy; easy to work and of good quality for cabinet work. Parenchyma paratracheal and indistinct, also in numerous, distinct, irregular bands, sometimes uniting the pores, at other times widely spaced and indicating limit of growth rings. Pores of fairly small or medium size; few to numerous; in radial multiples or rows, less frequently solitary or in small clusters; open. Rays fine, fairly numerous, and unevenly spaced on cross section; sometimes faintly distinguishable without lens on tangential; fairly distinct in some specimens on radial surface. Ripple marks absent. Vertical ducts, gummosis type, are of common occurrence.

Vessel perforations simple; intervascular pits small, numerous, and bordered; vessel-parenchyma pits half-bordered and often elongated. Rays mostly homogeneous. Wood fibers with simple or indistinctly bordered pits.

Zanthoxylum juniperinum Poepp. & Endl. Nov. Gen. & Sp. 3: 77. 1845. *Hualaja.*

Tree, from 55 to 70 feet in height. Crown round or pyramidal. Trunk straight, round, up to 14 inches in diameter, unbranched for 30 to 55 feet, and with small buttresses. Bark pale gray or medium to purplish brown, fairly smooth. Flowers small, white; October–November.—Not widely distributed; in dense, flood-free forest (alt. 500 ft.).

Sapwood white or pale grayish brown, streaked; heartwood pale yellow and darkening slightly on exposure, sometimes not well defined. Wood odorless, but has a slightly bland taste; straight- or roey-grained; medium-textured; of medium weight, firm, and strong; inclined to be splintery, easy to work, takes a smooth polish with a high luster, and holds its place well. Growth rings indicated by terminal parenchyma and slight variation in depth of color. Parenchyma in widely and unevenly spaced concentric lines. Pores small or fairly so; moderately numerous, well distributed; solitary or in radial multiples of 2, seldom more; open. Vessel lines fine, short or long, of same color as or slightly darker than background, and at limit of vision when held to proper light. Rays fine, unevenly spaced, lighter-colored than adjacent fibers, and faintly visible to unaided eye on cross section; invisible or barely distinguishable on moistened tan-

gential; visible without lens against the lustrous background on radial surface. Pith medium brown.

Loreto: near Yurimaguas, *4911;* Puerto Arturo, lower Huallaga, *5205.*

Zanthoxylum Pterota HBK. Nov. Gen. & Sp. 6: 3. 1823. *Shapillejo.*

Tall shrub or small slender tree, from 15 to 18 feet in height. Crown open. Trunk short, branching a few feet from the base, and armed with stout spines about 0.5 inch long. Bark pinkish or dark purplish brown with pale gray patches, and moderately smooth. Flowers small, yellowish green; December–January.—Not common; in open sandy or dry loam in clearings or among shrubs and low trees of second growth (alt. 500–1,500 ft.).

Wood almost white, pale yellow, or light brown; odorless and tasteless; straight- or roey-grained; medium-textured; fairly light in weight, but firm and rather tough for its weight; saws slightly woolly, easy to work, capable of taking a smooth, lustrous polish, and holds its place well when finished. Growth rings present owing to terminal parenchyma. Pores small; numerous or very numerous, inclined at times to be crowded; solitary or in radial multiples of 2–3, seldom tangentially disposed; open. Vessel lines short, fine, and visible without lens in proper light. Rays fine, fairly numerous, lighter-colored than background, and faintly discernible without lens on moistened cross section; rather distinct on radial surface. Pith pale brown, narrow.

Loreto: Yurimaguas, *4751.*—San Martín: Tarapoto, *5510.*

Zanthoxylum Ruizianum Kl. ex Engl. in Mart. Fl. Bras. 12, pt. 2: 170. 1874. *Quillo-casha.*

Tree, from 22 to 30 feet tall. Crown spreading. Trunk straight, round, slender, unbranched for 9 to 12 feet, and armed with stout spines about 0.25 inch long. Bark pale gray or medium brown and fairly smooth. Flowers small, yellow; December–January. —Fairly common on the plain of Tarapoto (alt. 1,500 ft.), among low trees and shrubs of second growth, also at San Roque (alt. 3,500 ft.).

Wood pale greenish yellow, lustrous; odorless, but has a slightly bitter taste; straight-grained; medium-textured; of medium weight; inclined to be splintery and saws woolly, easy to work, takes a smooth finish. Growth rings indicated by terminal parenchyma. Pores small; fairly numerous and well distributed; solitary or in

small radial multiples; open or closed. Vessel lines fine and indistinct. Rays barely at limit of vision on moistened cross and radial sections.

San Martín: Tarapoto, *6500*, *6669*.

Zanthoxylum Sprucei Engl. in Mart. Fl. Bras. 12, pt. 2: 167. 1874. *Espina.*

Tree, approximately 40 feet in height. Crown spreading. Trunk straight, round, slender, unbranched for 15 feet, and armed with stout spines. Bark pale gray, pinkish or medium brown, and fairly smooth; inner bark somewhat fibrous. Seeds rounded and lustrous black.—Not common; in sandy or dry medium loam in scant or fairly dense growth (alt. 500–1,400 ft.).

Wood creamy yellow or pale white throughout with extensive grayish areas and brown striping caused by stain; has no distinctive odor or taste; straight-grained; medium-textured; fairly light or moderately heavy; easy to cut, takes a moderately smooth, dull finish, and holds its place well. Growth rings present owing to variation in abundance of parenchyma, which is in irregular, broken or fairly continuous, concentric bands, of lighter color than background, and visible without lens. Pores small or fairly small; not numerous or moderately numerous and well distributed; in radial multiples of 2–3, less frequently solitary. Vessel lines fairly fine and darker than background. Rays fine, of same color as parenchyma bands, and discernible only with lens on cross section; indistinct or visible only with lens on other surfaces.

Loreto: Yurimaguas, *4006*.—San Martín: Morales, near Tarapoto, *5681*.

Zanthoxylum valens Macbr., comb. nov. *Fagara valens* Macbr., Candollea 5: 373. 1934.

One of the tallest trees encountered in the forest of the lower Peruvian Amazon, attaining a height of approximately 140 feet, and very conspicuous when in blossom. Crown open. Trunk straight, round, 22 inches in diameter, unbranched for 60 feet, with small buttresses, and armed with few strong spines on the bole and older branches. Bark deep pink or rufous brown and fairly smooth; inner bark pinkish brown. Flowers small but showy, pale yellowish white, and slightly fragrant; May–June.—Uncommon; in dense growth in dry medium loam (alt. 400 ft.).

Wood oatmeal-colored or pale yellow with extensive grayish areas caused by stain; has no distinctive odor or taste; straight-

grained; medium- or rather coarse-textured; light in weight, but firm and strong; easy to cut, but requires a sharp knife to cut smoothly across grain, takes a fairly smooth finish; not very durable. Growth rings absent or inconspicuous. Parenchyma paratracheal and in broken or fairly continuous, concentric bands uniting the pores. Pores barely at limit of vision; fairly numerous, uniformly distributed; in radial multiples of 2–4, less frequently solitary; open or filled with black or white deposits. Vessel lines either of same color as background and indistinct or much darker than the surrounding elements owing to black gum present. Rays fine and discernible only with lens on cross and tangential sections; sometimes distinguishable to unaided eye on radial surface. Pith yellowish brown.

Loreto: Pebas, *1962*.

SIMARUBACEAE. Simaruba Family

1. **PICRAMNIA** Swartz

Slender trees or shrubs. Leaves persistent, pinnate; the leaflets entire, opposite or alternate, petiolulate. Flowers very small, greenish, dioecious, in spike-like or branched panicles. Fruit baccate.

Sapwood yellowish, pale grayish, or purplish brown; heartwood reddish or purplish. Wood fairly fine- or medium-textured; of medium weight and brittle; easy to work; not very durable. Parenchyma indistinct. Pores of small or medium size; rather few to fairly numerous and well scattered; in multiples or less often solitary, in small radial rows, or in clusters; infrequently filled with lustrous tyloses. Rays rather broad on cross section; sometimes distinct on moistened tangential; fairly distinct on radial surface.

Vessel segments long and narrow; vessel perforations simple; intervascular pits elongated and sometimes coalescing, or round and with slit-like apertures. Rays heterogeneous; uni- or biseriate. Wood fibers thin-walled.

Picramnia lineata Macbr. Candollea 5: 373. 1934. *Sanipanga.*

Tree, 50 feet in height. Crown spreading. Trunk straight, round, from 7 to 15 inches in diameter, and clear of limbs for 18 feet. The crushed leaves yield a violet dye.—Not common; in open dry loam (alt. 500 ft.). Wood used occasionally for fuel.

Loreto: Yurimaguas, *4629*.

Picramnia macrostachys (Kl.) Engl.(?), in Mart. Fl. Bras. 12, pt. 2: 238. 1874.

Tree, about 30 feet tall. Crown spreading. Trunk straight, round, from 7 to 10 inches in diameter, and free of branches for 18 feet. Bark pale pinkish brown, with small, darker brown lenticels; inner bark dark brown. Fruit small, ovoid, and pale pink when mature; June–July.—In fairly dense forest free from floods (alt. 380 ft.). Wood used for general construction and fuel.

Sapwood yellowish white and well demarcated, turning to yellowish brown on exposure; heartwood purplish brown with a grayish cast. Wood odorless, but has a very bitter taste; straight-grained; uniformly fine-textured; light in weight, but firm and rather tenacious; not difficult to work and capable of taking a smooth polish; durable. Growth rings absent. Parenchyma indistinct. Pores very small; not numerous, well scattered; solitary, also in radial multiples, seldom rows, of 2–3, infrequently in diagonal pairs or small clusters; mostly open. Vessel lines very fine, sometimes faintly discernible in heartwood on account of pale brown deposit. Rays moderately fine and readily distinguishable with lens on cross section; indistinct on tangential; infrequently distinguishable to unaided eye on moistened radial surface.

Loreto: La Victoria, *2929*.

Picramnia magnifolia Macbr. Candollea 5: 376. 1934.

Tall shrub or small, slender tree, 12 feet in height, with pendent branches. Trunk branching 4 or 5 feet above the ground. Bark pale or dark reddish brown, with small, darker brown lenticels; wood beneath bark purplish brown. The crushed leaves yield a sap reputed to be used by the natives for healing wounds. Flowers orange yellow. Fruit ovoid, yellow; June–July.—Of limited distribution; in fairly dense forest (alt. 380 ft.).

Sapwood pale yellow when fresh, with pinkish or violet brown streaks and extensive grayish brown areas when dried; heartwood deep pinkish brown. Wood odorless and tasteless; straight- or moderately straight-grained; rather fine-textured; of light weight. Growth rings absent or poorly defined. Pores minute and barely visible with lens. Rays very fine and numerous on cross section; indistinct on tangential; lighter-colored than adjacent elements on radial surface and sometimes visible without lens along the outer margin of sapwood; upright cells distinguishable with lens.

Loreto: Pebas, *1737*, *1879*.

Picramnia martiniana Macbr. Candollea 5: 374. 1934.

Slender shrub, from 15 to 18 feet tall. Crown fairly dense. Trunk branching 6 or 7 feet from the ground. Bark pale yellow to dark brown, fairly smooth; wood beneath bark reddish or purplish brown. —Common in some localities; in dense forest (alt. 3,500 ft.). Wood not used locally.

Sapwood pale brown and composing most of the wood; heartwood purplish, well defined. Wood odorless and tasteless; straight- or wavy-grained; fine- or medium-textured; light or moderately light in weight, but fairly tenacious; not difficult to work and takes a smooth finish; moderately durable. Growth rings absent or indistinct. Parenchyma not visible with lens. Pores small or moderately small; fairly numerous and uniformly distributed; in radial multiples or rows of 2–4, seldom more, less frequently solitary or in small clusters; mostly open. Vessel lines fine and indistinct. Rays lighter-colored than fibers and faintly visible without lens on moistened cross section; indistinct on tangential; at limit of vision, but not distinct, on moistened radial surface.

San Martín: San Roque, *6943, 6975.*

BURSERACEAE. Torchwood Family

Unarmed trees or shrubs, often with aromatic sap. Leaves alternate, estipulate, usually deciduous, pinnate; the leaflets entire, narrow, and long-pointed. Flowers small, greenish white, perfect or unisexual, usually paniculate. Fruit a capsule or somewhat fleshy, containing 1 to 5 stones. The members of this group are mostly aromatic or resiniferous and are better known for the gum-resins which exude from the bark than for their timbers.

Sapwood pinkish or variegated light brown; heartwood reddish or dark brown. Wood fine- to medium-textured; light to heavy; durable and of good quality. Parenchyma sparingly developed and indistinct; paratracheal and in very fine, broken, tangential or concentric lines or bands. Pores small or medium-sized; numerous, scattered; solitary or in radial multiples of 2–3; open or closed. Rays fine; sometimes distinguishable on radial surface. Small radial canals have been observed in the bark in *Protium.*

Vessels have simple perforations; intervascular pits large, often crowded, bordered; vessel-ray pits large, elongated, simple or half-bordered. Rays typically heterogeneous, cells large; uniseriate. Wood fibers thin-walled and often septate.

1. CREPIDOSPERMUM Hook. f.

Crepidospermum Goudotianum Triana & Planch. Ann. Sci. Nat. V. 14: 300. 1872. *Trompetero-caspi, Isula-micuna.*

Shrub or small tree, seldom exceeding 12 feet in height. Bark pale gray to dark brown, fairly smooth or with shallow ridges. Leaves alternate; leaflets petiolulate, ovate-oblongate, acuminate, serrate. Inflorescence in axillary panicles. Drupe unevenly round, green; December–January.—Of limited distribution; in open sandy loam or in scant forest (alt. 1,400–3,500 ft.).

Wood lustrous pinkish brown, darkening slightly on exposure; odorless and tasteless; straight- or roey-grained; fine-textured; heavy, strong, and tenacious; easy to work and takes a smooth polish; durable. Growth rings absent or poorly defined. Parenchyma indistinct with lens. Pores visible without lens; fairly numerous, evenly distributed; solitary or in radial multiples of 2–4, sometimes more, seldom in small clusters; open or filled with dark gum. Vessel lines fine, short, and of darker color than background. Rays very fine; barely distinguishable with lens on cross and tangential sections; slightly darker than the surrounding elements and visible to unaided eye on radial.

San Martín: Tarapoto, *5869*.

2. PROTIUM Burm.

Shrubs or small to large trees, widely distributed in tropical America and with a few representatives in the eastern tropics. They are glabrous or nearly so. Leaflets few, large, entire. Flowers small, whitish, in small or large panicles. Fruit rather large and somewhat fleshy at maturity. The woods in general resemble birch (*Betula lenta* L.) and are used for general construction and other purposes to which we apply birch. They are more valued, however, for the whitish and fragrant resin (suggesting incense) exuding freely from the bark, which hardens on exposure to the air.

Sapwood whitish or pinkish to pale brown; heartwood reddish or dark brown. Wood has no distinctive odor or taste; fine- or medium-textured; fibrous or splintery to hard, compact, and capable of taking a smooth, lustrous polish; often durable. Parenchyma indistinct; paratracheal and in broken tangential lines or concentric bands. Pores of small to medium size; fairly numerous to numerous; solitary or in short multiples; open or closed. Rays fine on cross section; sometimes fairly distinct on radial.

Vessels with simple perforations. Rays heterogeneous; uniseriate. Small radial canals present in the rays and sometimes in the bark.

Protium Carana March. in Baill. Adansonia 8: 51. 1867–68; Mart. Fl. Bras. 12, pt. 2: 277. 1874. *Copal-caspi.*

Shrub or small, slender tree, from 10 to 15 feet in height. Bark tan-colored or purplish brown, fairly smooth. Leaflets membranaceous, nearly glabrous, and long-stalked. Fruit ovoid, attenuate at base, acute at top, tri-partite, with fleshy, juicy pericarp, deep red when mature, and borne in clusters on the trunk.—Fairly common in some localities; in slightly humid or dry loam (alt. 500 ft.).

Sapwood pinkish or pale brown; heartwood slightly darker brown. Wood straight- or interwoven-grained; uniformly fine-textured; of medium weight to fairly heavy and tenacious; not difficult to work and takes a fairly smooth polish; durable. Growth rings present, but indistinct. Parenchyma paratracheal; not distinct with lens. Pores fairly small; numerous and uniformly distributed; solitary, less frequently in radial multiples of 2–5 or in small clusters. Rays evenly spaced on cross section; faintly distinguishable to unaided eye on radial.

Loreto: lower Huallaga, *4766*(?), *5056*, *5356*(?).

Protium crassifolium (Rich.) Engl.(?), in Mart. Fl. Bras. 12, pt. 2: 270. 1874. *Copal-caspi.*

Tall, forest tree, up to 95 feet in height. Crown spreading and with dense foliage. Trunk straight, round, 21 inches in diameter, and free of branches up to 32 feet. Bark pale or pinkish brown, fairly smooth. Twigs dark puberulous. Leaflets subleathery, nearly glabrous. Fruit a glabrous, round or ovoid drupe.—Of limited distribution. Timber is sometimes used for general construction.

Sapwood well defined, deep pinkish brown; heartwood dark reddish brown. Wood straight- or roey-grained; medium-textured; heavy, hard, strong, and compact; not difficult to work and capable of taking a smooth polish; durable.

Loreto: San Ramón, lower Huallaga, *4564*.

Protium glaucum Macbr. Candollea 5: 379. 1934.

Uncommon, glabrous tree, seldom exceeding 30 feet in height. Crown spreading. Trunk erect, cylindrical, about 8 inches in diameter, and unbranched for 3 or 4 feet. Bark pale gray or dark purplish brown, fairly smooth; inner bark coarsely fibrous. Leaflets

membranaceous. Flowering in October–November.—In thickets or along margin of flood-free forest (alt. 500 ft.). Timber is used only for fuel.

Sapwood pale yellowish or light pinkish brown and darkening on exposure to air; heartwood dark brown. Wood straight-grained; medium-textured; of medium weight; saws slightly woolly, easy to cut, and capable of taking a moderately smooth polish; fairly durable. Pores frequently filled with whitish or dark brown deposits. Rays slightly wavy and of lighter color than fibers on cross section; darker than background and at limit of vision on radial.

Loreto: Yurimaguas, *4772*.

Protium Llewelyni Macbr. Candollea 5: 378. 1934.

Tree of small stature, not exceeding 30 feet in height. Crown open. Trunk erect, round, about 6 inches in diameter, and unbranched for 12 feet. Bark reddish brown, fairly smooth; inner bark fibrous. Leaflets subleathery, glabrous, opaque. Flowers yellowish; July–August. Drupe glabrous.—Uncommon; along margin of forest (alt. 400 ft.). Wood not used locally except for fuel.

Wood lustrous pinkish brown throughout, occasionally with long, darker brown striping; straight-grained; medium-textured; of medium weight, strong; easy to work and takes a fairly smooth polish; durable. Growth rings poorly defined. Pores sometimes filled with yellowish white or pale brown deposit.

Loreto: near Iquitos, *3704*.

Protium medianum Macbr. Candollea 5: 377. 1934.

Medium-sized tree, about 55 feet in height. Crown open. Trunk straight, round, 12 inches in diameter, and free of limbs for approximately 15 feet. Bark pinkish or dark brown, fairly smooth; inner bark slightly fibrous. Leaflets leathery, nearly glabrous. Flowers yellowish brown; September–October.—Not common; in second growth or along margin of forest (alt. 400 ft.). Timber is used for fuel.

Sapwood oatmeal-colored or pale brown; heartwood slightly darker brown, thin. Wood straight-grained; medium-textured; light in weight; easy to cut, takes a lustrous polish; fairly durable. Growth rings present, but poorly defined. Pores of medium size; not numerous, uniformly distributed; solitary and oval in outline, also in radial multiples of 2–4; open.

Loreto: near Iquitos, *3792*.

Protium puncticulatum Macbr. Candollea 5: 377. 1934. *Copal-caspi.*

Small or medium-sized, glabrous tree, at times attaining a height of 45 feet. Crown round or spreading. Trunk columnar, moderately straight, from 6 to 10 inches in diameter, and unbranched for from 3 to 10 feet. Bark reddish or purplish brown, with broad, low ridges. Leaflets membranaceous-chartaceous and have a strong odor suggesting gum arabic. Drupe subround.—Not common; in fairly dense forest or along banks of streams (alt. 500 ft.). Timber is sometimes used for general construction. Bark and fruit furnish a yellow resin employed for calking canoes.

Wood light pinkish brown with a pale grayish cast and occasionally with darker brown streaks; straight-grained; medium-textured; of medium weight; sometimes requires a sharp knife to cut smoothly across grain, easy to work, and capable of taking a smooth polish with a moderate luster; fairly durable. Growth rings indistinct or present on account of variation in abundance of elements. Parenchyma indistinct with lens. Pores small; not very numerous, inclined to be grouped in zones; solitary, less frequently in radial multiples of 2–3, seldom in oblique or tangential pairs; open or closed. Vessel lines appear as very fine scratches of same color as background. Rays fine; indistinct without lens on cross and tangential sections; slightly darker than background on radial.

Loreto: Paranapura, lower Huallaga, *4625;* Santa Rosa, lower Huallaga, *4861.*

Protium subserratum Engler, in DC. Monogr. Phan. 4: 89. 1883.

Medium-sized, forest tree, about 50 feet in height. Crown round. Trunk erect, columnar, about 12 inches in diameter, unbranched for 36 feet, and with low buttresses. Bark greenish yellow or reddish brown; inner bark dark chocolate brown and fibrous. Twigs dusky pilose. Leaflets membranaceous. Drupe ovate-cordiform; October–November.—Uncommon; in dense forest not subject to periodical inundations (alt. 500 ft.). Timber sometimes used for general construction.

Sapwood well defined, light pinkish brown and with fine, slightly darker brown veining; heartwood reddish brown. Wood straight-grained; medium-textured; of medium weight; fibrous, easy to cut, takes a highly lustrous polish; checks in drying, but fairly durable. Growth rings present. Pores of medium size; not numerous, well

scattered; solitary and angularly round in outline, less frequently in radial multiples of 2–5 or in small clusters. Vessel lines distinct against the lighter-colored background; lustrous tyloses and whitish calcium deposit common. Rays faintly visible without lens on moistened tangential section; readily distinguishable but not prominent to unaided eye on radial.

Loreto: Fortaleza, lower Huallaga, *4417*.

Protium tenuifolium Engler, in DC. Monogr. Phan. 4: 76. 1883.

Slender tree, from 18 to 28 feet in height. Crown spreading. Trunk straight, round or moderately so, slender, and unbranched for 6 to 12 feet. Bark reddish brown or dark purple, fairly smooth or rough. Leaflets membranaceous. Fruit round, reddish pink when mature, and yields an abundance of white, astringent resin with a strong odor suggesting turpentine; December–January.—Very common on the plain of Tarapoto and in the vicinity of Lamas (alt. 1,400–1,800 ft.); in second growth or in moderately dense forest. Timber used for fuel only.

Sapwood well defined, pinkish brown and with fine, darker brown streaks; heartwood reddish brown. Wood straight- or irregular-grained; uniformly fine-textured; rather heavy, dense, and tough; not easy to work, takes a smooth, lustrous polish; durable. Growth rings present. Parenchyma indistinct. Pores very small; fairly numerous and evenly distributed; solitary, infrequently in small radial multiples; open or closed. Rays faintly visible on radial surface.

San Martín: Tarapoto, *5708, 6138, 6289*.

MELIACEAE. Mahogany Family

Trees or shrubs. Leaves alternate, pinnate, without stipules. Flowers small, in panicles; the calyx 4–5-lobed, petals 4–5, stamens 5, 8, or 10. Fruit a capsule or drupe. The family comprises more than 600 species, widely distributed in tropical and subtropical regions of both hemispheres, and is important as the source of such valuable timbers as the mahoganies of tropical America and Africa, the American cedars, andiroba or crabwood, and the cedar-like toon of Australia.

The woods of the different genera exhibit considerable variation in their properties. Sapwood pinkish to pale yellowish white or frequently light or pinkish brown, often streaked or with a grayish cast when dried; heartwood pinkish, reddish, purplish, or dark chocolate brown, and usually well defined. Wood often fragrant;

fairly fine- to coarse-textured; light and soft to heavy, firm, and compact; often fibrous or splintery, easy to work, capable of taking a smooth and fairly or highly lustrous polish; moderately durable to highly durable. Parenchyma paratracheal and often indistinct, also in fine or very distinct, sometimes wavy, usually single, concentric lines or bands, mostly widely spaced or of variable spacing, but sometimes wide enough apart to appear as limiting growth rings; lighter or darker than background. Pores fairly small or large; few to moderately numerous and diffuse- or ring-porous; predominantly solitary, also in radial multiples or small clusters; light to dark brown gum, calcium deposit, or lustrous tyloses often present. Rays fine or moderately fine to visible, but not very distinct, on cross section; indistinct or scarcely visible to rather distinct on tangential; distinct and may be conspicuous on radial, where they sometimes add materially to the figure on quarter-sawed lumber, appearing lighter or darker than background. Ripple marks observed in *Carapa* (occ.), *Cedrela* (occ.) and *Swietenia;* all elements storied; uniform or irregular. Vertical canals, of gummosis type, are present in *Carapa, Cedrela, Melia,* and *Swietenia.*

Vessel perforations exclusively simple; segments sometimes barrel-shaped; intervascular pits minute or small, numerous, and crowded, the apertures slit-like and often coalescing; vessel-ray pits small, half-bordered. Rays distinctly heterogeneous, in some species showing a tendency to homogeneous; often coarse-celled and gummy; uniseriate or biseriate in part to multiseriate (2–5 cells wide) and few to 30 or more cells high. Wood fibers sometimes septate; pits simple, small, and inconspicuous or with slit-like orifices extending beyond the borders.

1. CARAPA Aubl.

Carapa, aff. **guianensis** Aubl. Pl. Guian. 2: Suppl. 32. 1775. *Andiroba.*

Tree, from 95 to 100 feet or more tall. Crown spreading. Trunk straight, cylindrical, 20 inches in diameter, clear of branches for about 55 feet, and with low buttresses. Bark dark reddish brown; inner bark slightly fibrous. Leaflets very large and leathery. Flowers white, showy, in axillary panicles. Fruit a woody, 4-angled capsule; the seeds are rich in oil used as an illuminant and for making soap. —Fairly common in the lower Peruvian Amazon (alt. 400–450 ft.); in *alturas* in dense, tall forest. Timber is employed for carpentry and general construction.

Sapwood constitutes the greater part of the wood and is sharply defined, lustrous pale brown with darker brown markings of rays and occasionally with long, dark brown streaks; heartwood dark reddish brown. Wood odorless and tasteless; roey- or straight-grained; medium-textured; heavy or fairly heavy; easy to work, capable of taking a smooth polish, and holds its place well when finished; does not stain in drying and is durable. Growth rings present owing to arrangement of elements. Parenchyma in unevenly spaced, concentric lines. Pores visible as fine pinpoints; fairly numerous and have a tendency to zonate arrangement; solitary or in small radial or diagonal multiples; mostly open. Vessel lines fine, of darker color than background, and at limit of vision in proper light. Rays numerous, fine or moderately fine, slightly wavy, and visible with lens on cross section; faintly distinguishable without lens on tangential; darker than the surrounding elements and rather prominent on radial surface.

Loreto: Pebas, *1808;* Caballo-cocha, *2256.*

2. CEDRELA L.

Small or large trees. Leaves large and pinnately compound; the leaflets entire. Flowers inconspicuous. Fruit a capsule which, upon opening, liberates great quantities of small, winged seeds. Next to mahogany (*Swietenia macrophylla* King), "cedro colorado" is the most important timber exported from northeastern Peru. On account of its abundance, fragrance, stability, durability, strength, and the ease with which it can be worked, cedar is much esteemed locally for canoes, furniture, house construction, utensils, chests, and other miscellaneous uses.

The classification of the Peruvian cedars is still uncertain. In their Flora Peruviana et Chilensis, Ruiz and Pavón (1802) described *Cedrela odorata* from the following regions in Peru: Posuso, Panao, Chinchao, and the neighborhood of Lima, where it is cultivated. In his discussion of *C. Herrerae* Harms (Revista Sudamericana de Botanica 1, No. 1: 21. February, 1934), Herrera lists the following four species as ascribed to Peru: *C. fissilis* Vell.; *C. odorata* R. & P.; *C. Herrerae* Harms; and *C. angustifolia* DC. Of these, he maintains that only two have been properly determined: namely, *C. fissilis* Vell., collected by Weberbauer (Pflanzenw. der Per. And. 285. 1911) in the Monzón Valley, Department of Huánuco; and *C. Herrerae* Harms, collected near Urquillos, Urubamba Valley. He considers that the other two species should be eliminated from the flora of Peru.

It is not clear that *C. odorata* of Ruiz and Pavón is the *C. odorata* L. of the West Indies. Harms (Notizbl. Bot. Gart. Berlin 10: 180. 1927) lists, however, *C. odorata* L. from the upper Marañón and cites C. DeCandolle (1917) and Ducke (1922) in support of its existence in the Amazon.

The following description of the wood of the genus is based only on material of *C. fissilis* and of the species which is here listed as *C. odorata.*

Sapwood whitish, pinkish, or yellowish brown; heartwood reddish or dark chocolate brown, well defined. Wood coarse-textured; light and soft to fairly heavy and durable; sometimes fibrous, easy to work; at times susceptible to sap and gum stain and liable to be damaged by insects. Parenchyma paratracheal, sometimes aliform and terminal; often darker than background and distinct. Pores fairly small or large; few, diffuse- or ring-porous; solitary, less often in multiples, seldom in clusters; often filled with light brown gum. Rays fairly fine to moderately distinct on cross section; visible and at times distinct on tangential; lighter or darker than background and often very distinct on radial surface. Vertical canals, gummosis type, occasionally present and filled with dark gum.

Vessels with simple perforations; segments barrel-shaped; intervascular pits small, numerous, and with slit-like apertures; vessel-ray pits half-bordered. Rays heterogeneous and show a tendency to homogeneous; mostly 3–5 cells wide and few to about 40 cells high; gum and crystals of calcium oxalate frequently present. Wood fibers often in definite radial arrangement and with small, simple pits.

Cedrela fissilis Vell. Flor. Flumin. Text 75. 1825; Icones 2: *pl. 68.* 1825; DC. Monogr. Phan. 1: 741. 1878. *Cedro, Cedro blanco.*

Tree, 45 feet or more in height. Crown spreading or conical. Trunk straight, cylindrical, slender, and free of limbs for about half the height. Bark thick, grayish or purplish brown, and fairly smooth. Leaves petiolate, the leaflets entire, subsessile, oblongate or lanceolate, acuminate or abruptly acuminate at apex, rounded or acute at base, glabrous above. Flowers in panicles. Fruit a 5-valved capsule; seeds with a terminal wing.—Of limited distribution; in thickets, old clearings, or along margin of fairly dense forest (alt. 1,500 ft.). Timber is not used locally except for fuel.

Wood variable from oatmeal-colored to light brown and with long, grayish streaks; light and soft; saws rather woolly, easy to cut,

and takes a smooth, lustrous finish; does not appear to be durable. Pith fairly large and pinkish brown.

San Martín: Tarapoto, *5825*.

Cedrela odorata L. Syst. Nat. ed. 10. 940. 1759; ex Harms, Notizbl. Bot. Gart. Berlin 10: 180. 1927. *Cedro colorado.*

A dominant species of the forests of northeastern Peru, determined provisionally as *Cedrela odorata* L. The tree frequently attains a height of 80 and at times up to 120 feet or more. Crown almost flat, round, or open. Trunk straight, cylindrical, up to 40 inches in diameter above the moderately large buttresses, and clear of limbs for about three-fourths the height. Bark thick, dark reddish brown, and with coarse scales suggesting mahogany. Leaves long-petiolate; the leaflets usually in 10 pairs, opposite, short-stalked, oblongate, lance-oblong, or ovate, acuminate or acute at apex, obliquely rounded at base, lustrous above, pale brown beneath, glabrous. Capsule ellipsoidal, pale brown when ripe and covered with small, light brown, scale-like markings; fruiting in October–November.—Abundant in both the lowland and upland forests (alt. 400–4,500 ft.). Cedar and mahogany are the most highly esteemed timbers for export and local applications. At the present time logging is confined mostly to the lower Ucayali and Huallaga regions. The logs are floated down river to the Nanay mills to be sawed into lumber or to be shipped to the United States or Europe. Locally, the wood is used for launches, canoes, house construction, furniture, chests, crates for shipping rubber and balata, carpentry, and miscellaneous purposes. (For further notes see page 46.)

Sapwood yellowish or white, sharply defined; heartwood variable in color from pinkish to dark brown and highly lustrous. Wood distinctly fragrant and slightly bitter when freshly cut; usually straight-grained; medium- or coarse-textured; light and soft to moderately heavy, hard, and compact; easy to work, takes a smooth polish, and holds its place well when finished; durable. The wood of young trees, especially those located in the open and of rapid growth, appears to be less fragrant, lighter-colored, and softer than that of old forest trees. Growth rings visible on account of zonate arrangement of pores. Parenchyma readily visible in some specimens as widely and evenly spaced, concentric rings separating the growth rings, also in inconspicuous bands surrounding the pores. Pores variable from small to rather large and distinguishable to unaided eye; not numerous, diffuse- or ring-porous; solitary or in

FIG. 17. "Cedro colorado," *Cedrela odorata* L., at Fortaleza, lower Huallaga.

radial multiples or rows of 2–3; open. Vessel lines conspicuous, short or long, and darker than background. Rays fine and discernible only with lens on cross section; lighter or darker than background and distinct on tangential and radial surfaces. Gum ducts occasionally present in peripheral rows and filled with dark red deposit; distinct on longitudinal surfaces, especially on tangential.

Loreto: lower Itaya, *150, 200;* lower Huallaga, *4211.*—San Martín: San Roque, *7397.*

3. GUAREA Allem.

Trees or large shrubs. Leaflets few or numerous, entire. Flowers small, greenish, chiefly in axillary panicles. Capsule 3–5-celled, with 1 or 2 seeds in each cell. The timber is of good quality and is used locally for miscellaneous purposes.

Sapwood whitish, pale yellowish, or pinkish to light brown, usually with a grayish cast when dried; heartwood pinkish, reddish, or purplish brown. Wood sometimes has a fragrant odor; fairly fine- to coarse-textured; moderately light and firm to heavy and compact; sometimes brittle or splintery, easy to work, and takes a smooth finish with a moderate or high luster; usually durable and suitable for joinery, carpentry, and particularly for interior work of houses. Parenchyma abundantly developed and often distinct; paratracheal, aliform, and in tangential, diagonal, or concentric bands, frequently uniting the pores. Pores of medium size to large; rather few; predominantly solitary, also in radial multiples, less often in clusters; open or at times filled with dark gum, calcium deposit, or lustrous tyloses. Rays fine or moderately fine and rather numerous on cross section; of same color as background and indistinct on tangential and radial surfaces.

Vessels with simple perforations; intervascular pits small, with slit-like apertures, sometimes extending beyond the margins; vessel-ray pits half-bordered. Rays heterogeneous to homogeneous; uniseriate or biseriate in part and few to about 40 cells high. Wood fibers sometimes septate; pits small and with slit-like orifices.

Guarea aligera Harms, Notizbl. Bot. Gart. Berlin 10: 181. 1927.

Small tree. Crown spreading. Trunk moderately straight, round, 6 inches in diameter, and unbranched for 18 feet. Bark light brown, fairly thin, and with long, narrow scales.—Not widely distributed; in rather dense forest free from periodical floods (alt. 500 ft.).

Sapwood fairly sharply demarcated, uniform pale brown with a gray cast; heartwood reddish brown. Wood odorless and tasteless; straight-grained; medium- to fairly coarse-textured; rather heavy and strong, but inclined to be splintery; easy to work and takes a smooth finish with a moderate luster; checks in drying; appears to be durable. Growth rings present owing to variation in depth of color. Parenchyma in association with pores, indistinct with lens, also in numerous, irregularly spaced, broken, tangential lines or

fine bands. Pores of medium size and barely at limit of vision; not very numerous; in radial multiples or rows of 2–5 or solitary; open or closed. Vessel lines numerous and rather coarse; lustrous deposit commonly present. Rays numerous, fine, and barely visible with lens on cross section; slightly darker than background and at limit of vision on radial surface.

Loreto: Puerto Arturo, lower Huallaga, *5333*.

Guarea filiformis C. DC.(?), Monogr. Phan. 1: 566. 1878.

Medium-sized tree, up to 50 feet or more in height. Crown open. Trunk straight, round, slender, and unbranched for 28 feet. Bark pale pinkish brown, fairly thin, and moderately smooth.—In dry medium loam along margin of forest or in open patches among low or medium-sized trees (alt. 450 ft.).

Sapwood pale yellowish or light brown, well demarcated; heartwood pinkish or purplish brown. Wood odorless and tasteless; moderately straight- or interwoven-grained; medium-textured; of medium weight; not difficult to work, takes a moderately smooth finish, and holds its color and place well; probably durable. Growth rings present. Parenchyma visible with lens as numerous, broken or continuous, concentric bands. Pores of medium size; solitary or in radial pairs; often filled with white or yellowish brown deposit. Vessel lines fairly fine or coarse. Rays fine and numerous on cross section; visible only with lens on cross and tangential sections; distinguishable without lens on radial surface.

Loreto: Yurimaguas, lower Huallaga, *4668*.

Guarea fissicalyx Harms, Notizbl. Bot. Gart. Berlin 11: 383. 1932. *Paujil-ruru.*

Tree, 35 feet in height. Crown irregular. Trunk straight, round, 8 inches in diameter, and undivided for half the entire height. Bark reddish brown or chocolate-colored, and rough; inner bark rather coarsely fibrous. Flowers small, creamy white; May–June. Fruit khaki-colored when mature.—Not common; in dense forest clear of periodical floods (alt. 500 ft.).

Sapwood well defined, creamy yellow or pale brown with light gray streaks or patches caused probably by sapstain; heartwood reddish brown. Wood odorless and tasteless; fairly straight- or interwoven-grained; medium-textured; heavy, hard, and tenacious; not difficult to work, takes a moderately smooth finish, and holds its place fairly well; durable. Parenchyma in fairly continuous or

broken, wavy, light-colored, concentric bands; barely at limit of vision. Pores of medium size; in radial multiples of 2–3, also in diagonal pairs or solitary; mostly closed. Vessel lines visible without lens, but not prominent. Rays numerous, fine, lighter-colored than adjacent elements on cross section; visible only with lens on cross and radial surfaces.

Loreto: upper Nanay, *1232*.

Guarea grandifolia DC.(?), Prodr. 1: 624. 1824.

Tree, approximately 36 feet tall. Crown open and with few branches. Trunk straight, round, slender, and unbranched for 18 feet. Bark light tan- or medium chocolate-colored with a grayish tinge; inner bark coarsely fibrous or separates into long, thin flakes. Flowers pale yellow. Fruit round, depressed above, reddish brown when mature, with woody pedicel, and borne high on the trunk; June–July.—Fairly common near the Peruvian-Brazilian border; in dry loam in dense forest (alt. 380 ft.).

Wood creamy yellow or pale brown, with no distinction between sap and heart; straight-grained; medium-textured; fairly heavy and hard; not very difficult to work and takes a moderately smooth finish; checks in drying; appears to be durable. Parenchyma paratracheal and in numerous, fine, tangential bands uniting the pores. Pores of medium size or fairly small; moderately numerous and well scattered; in radial multiples of 2–3 or solitary; open or closed. Vessel lines darker than background and appear as long, fairly coarse scratches. Rays numerous, fine, light-colored on cross section; visible only with lens on cross and radial surfaces.

Loreto: La Victoria, *2771*.

Guarea maynasiana C. DC. Monogr. Phan. 1: 550. 1878.

Small tree or tall shrub, from 15 to 18 feet in height. Crown spreading. Trunk straight or slightly inclined, round, slender, and unbranched for from 4 to 9 feet. Bark light tan or medium reddish brown and moderately smooth. Fruit ovoid, dark brown, with small red seeds; July–October.—Widely distributed, but nowhere common; in light or medium loam along roadsides or among shrubs and low trees of second growth (alt. 400–1,400 ft.).

Sapwood pale brown; heartwood slightly darker brown. Wood straight-grained or moderately so; medium-textured; of medium weight; easy to cut. Growth rings present owing to variation in concentration of parenchyma, which is in numerous, broken or con-

tinuous, concentric bands; lighter-colored than adjacent elements and at limit of vision. Pores of fairly small or medium size; solitary or in small radial multiples, seldom in tangentially disposed pairs. Vessel lines moderately fine. Rays visible with lens on all surfaces.

Loreto: Pebas, *1740, 1752.*—San Martín: Tarapoto, *6537*(?).

Guarea trichilioides L. Mant. 2: 228. 1771. *Latapi, Latapicaspi* (lowland), *Requia* (upland).

Tree, at times attaining a height of 130 feet. Crown spreading. Trunk straight or moderately so, cylindrical, up to 28 inches in diameter, and unbranched for about half the entire height. Bark dark chocolate brown, occasionally with short, fairly coarse ridges; inner bark sometimes fibrous. Flowers white; June–July. Fruit subround, brown when mature; December–January.—Widely distributed throughout the montaña, but nowhere very common; in dry medium loam among shrubs and low trees of second growth, sometimes found in the vicinity of streams or in dense, flood-free forest (alt. up to 3,500 ft.). Timber is employed in Tarapoto for cooperage.

Sapwood constitutes most of the wood, oatmeal-colored to light brown; heartwood reddish or dark brown. Wood when fresh has an agreeable odor suggesting *Cedrela odorata* L.; straight-grained or moderately so; coarse-textured; of fairly light to medium weight; easy to work; checks in drying; liable to be damaged by insects and is not very durable. Parenchyma surrounds the pores and in rather broad tangential or diagonal bands, often confluent. Pores at limit of vision; fairly numerous and well scattered; solitary or in radial multiples of 2–4; open. Vessel lines long, coarse, and darker than background. Rays fairly numerous and moderately fine, slightly wavy, unevenly spaced, and distinguishable only with lens on cross section; invisible or visible to aided eye on other surfaces.

Loreto: La Victoria, *3160;* Yurimaguas, lower Huallaga, *4722.* —San Martín: Tarapoto, *6184;* San Roque, *7314.*

4. SWIETENIA Jacq.

Swietenia macrophylla King in Hook. Icon. Pl. 16: *pl. 1550.* 1886. *S. Tessmannii* Harms, Notizbl. Bot. Gart. Berlin 10: 180. 1927. *Aguano, Caoba.*

Tall, stately tree, from 90 to 160 feet or more in height, forming with other species the upper story of the forest. Crown full, spreading, or approaching umbrella-shape. Trunk erect, columnar, from

3 to 5 feet or more in diameter above the strong, narrow buttresses which reach up to 15 feet high, and unbranched for from one-third to half the entire height. Bark about 2 inches thick, scaly, deeply furrowed, of a reddish brown color, has a bitter taste suggesting quinine, and exudes when cut a small amount of slightly bitter, light brown sap. Leaves alternate; leaflets in 4 or 5 pairs, glabrous. Flowers with small calyx, pale yellowish green petals and staminal tube, and brown anthers; September to beginning of October. Fruit elongate-ovoid, about 6 inches long and 3.5 inches in greatest width, the thick woody exocarp light brown, and the central pentagonal axis about 4.5 inches in height; seeds winged, lustrous reddish brown, of a bitter taste.

Although of common occurrence in the Department of Loreto in low-lying regions, adjacent to streams and rivers, where the forest is subject to seasonal inundations, or where the soil is wet the year round, *tierra baja*, mahogany trees attain their best development in dense forest growth on slight elevations with dry, firm soil away from watercourses, *alturas*, but nowhere are they found in extensive or pure stands. In the upland forests, at altitudes of 1,000 to 3,500 feet, for example, the trees are generally smaller, the timber is slightly harder and heavier, apparently less susceptible to insect attacks, and is believed to be of better quality than that of the lowland. Mahogany trees are not found between the Nanay River and the Peruvian-Brazilian border and they do not grow west of Moyobamba, capital of the Department of San Martín.

In the vicinity of Iquitos, especially along the banks of the Amazon and its tributaries, mahogany trees have been cut for general rough uses and domestic purposes. In unexplored territories along the Ucayali, Huallaga, and Marañón and their tributaries, where little or no cutting has been done, the average occurrence of mahogany trees may be estimated to be approximately one tree per acre. (For further notes on Peruvian Mahogany see page 41; also Tropical Woods 6: 1. June, 1926; 14: 33. June, 1928; 16: 49. Dec., 1928; and 31: 30. Sept., 1932.)

Sapwood pale yellow when freshly cut, turning to yellowish brown on exposure, and from 2 to 6 inches thick; heartwood dark reddish brown, in dried material becoming pinkish brown with occasional darker striping, or in some instances turning to a uniform rich brown. Wood rather fragrant when fresh, but has no distinctive taste; straight- or ribbon-grained, suggesting Honduras mahogany, but not so highly figured; medium- to coarse-textured; of medium density to

FIG. 18. Stump and trunk of mahogany, *Swietenia macrophylla* King, at Santa Rosa, lower Huallaga.

heavy and firm; easy to work, takes a smooth polish with a high luster, and holds its place well when finished; susceptible to the attacks of spotworms and a beetle of the genus *Platypus* which causes pinhole defects accompanied by pale grayish stain produced by ambrosia fungus. Seasonal growth rings indicated by alinement of wood parenchyma. Parenchyma paratracheal and in continuous, unevenly spaced, concentric lines, which appear to indicate limits of growth rings, and of lighter or darker color than background; distinct on cross section, especially when moistened. Pores of medium size to large; numerous or moderately numerous, fairly well distributed or showing a distinct tendency to zonate arrangement; solitary, less frequently in radial multiples of 2–4, infrequently diagonally disposed or in small clusters; sometimes filled with dark reddish brown gum or white deposit. Vessel lines of variable length and producing fine markings, of darker color than background. Rays fine, uniform, lighter-colored than adjacent fibers, and barely discernible without lens on cross section; sometimes visible to unaided eye on tangential; of darker color than background and distinct, but not conspicuous, on radial surface. Ripple marks present and distinct; all elements storied; number per inch length, about 62. Vertical canals, gummosis type, present and sometimes distinct on tangential surface.

Vessels with simple perforations; segments barrel-shaped; intervascular pits numerous, minute, with slit-like apertures; vessel-ray pits small, half-bordered. Rays heterogeneous; 1–5 cells wide and few to about 30 cells high. Wood fibers often in definite radial arrangement, rather thin-walled, often septate, and with small, indistinct, simple pits.

Although Peruvian mahogany was described by Harms (l.c.) as *Swietenia Tessmannii*, examination of the woods shows close resemblance between the Peruvian and the Honduran species (*S. macrophylla* King) and this is substantiated by the similarity of the floral characters. In 1925, Dr. Tessmann, at the time associated with the Standard Oil Company, secured herbarium specimens of *Swietenia* at Yarina-cocha on the Ucayali River. This material was described by Dr. Harms as *Swietenia Tessmannii*. In early 1926, fruit and leaf specimens were gathered along the left bank of the Itaya River, some fifty miles from its confluence with the Amazon, by Mr. Georges H. Barrel, president of the former Aguna Mahogany and Timber Company, Boston, Massachusetts. These were sent to Professor Record (see Tropical Woods 6: 1–2. June, 1926) and

forwarded by him for identification to Dr. S. F. Blake, United States Bureau of Plant Industry, Washington, who reported as follows: "The leaf specimens of the Peruvian Mahogany are not distinguishable from *Swietenia macrophylla* King, and can be referred to that species temporarily with the reservation that flowering specimens may show differences. On geographical grounds, that species is the most likely to occur there. . . ." The forests along the Ucayali and Itaya rivers are of the same character, with little or no difference in altitude, so that, in all likelihood, the specimens collected from trees observed by Tessmann and Barrel represent the same species.

In his notes on the "Identity of the Peruvian Mahogany" (Tropical Woods 16: 49–50. Dec., 1928), Macbride observes: "*S. Tessmannii* is distinguishable by its author from *S. macrophylla* by the longer leaf-petioles (5–12 mm. long) and the looser inflorescence. The latter species, according to Harms, also generally has larger but narrower leaflets with somewhat broader acumen. He also compares *S. Tessmannii* with *S. Candollei* Pittier of Venezuela to which he thinks it may be most nearly related and remarks that it may be separated by the shorter leaflet petioles. According to the original descriptions, though, there seems to be no essential difference in this respect between the Peruvian and Venezuelan trees. There is a possibility, of course, that their pods may differ so greatly, particularly in proportionate measurements, that the two trees may indeed represent distinct species. On the other hand, *S. Tessmannii* is certainly very closely related to *S. macrophylla* of Colombia, Panama, and Honduras—the species to which Dr. Blake referred it, apparently with confidence." It appears that the characters relied upon at present to separate these species are not convincing and may prove to be relative only and valueless for purposes of classification.

Loreto: Santa Rosa, lower Huallaga, *4868;* herbarium material collected also at San Antonio, upper Itaya, and near Iquitos.—San Martín: Río Mayo, near its junction with the Huallaga, *6221;* San Roque, *7725.*

5. TRICHILIA L.

Large shrubs or trees. Leaflets pinnate, sometimes reduced to a single leaflet. Flowers small, greenish or yellowish, panicled, with 4–5 petals. Fruit normally a small 3-valved, 3-seeded capsule, which splits open at maturity; seeds not winged, 1 in each cell, and surrounded by a red and showy aril. The timbers serve locally for miscellaneous purposes, but are not commercially important.

Sapwood yellowish, whitish, or pinkish to light brown, often streaked or with a grayish tinge; heartwood purplish to dark or chocolate brown. Wood slightly bitter; fairly fine- or medium-textured; light but firm to heavy and hard; usually capable of taking a smooth and fairly lustrous to highly lustrous polish; often durable and has good possibilities for flooring. Parenchyma abundantly developed; paratracheal and in numerous, fine, much broken or continuous, tangential or concentric lines in contact with the edge of the pores or independent of them, and sometimes appear to indicate limit of growth rings; spacing very uneven. Pores small; fairly numerous and well distributed; solitary or in multiples, seldom in small clusters; sometimes filled with yellowish or whitish deposit. Rays very fine on cross section; distinct and usually darker than background on radial surface.

Vessels with simple perforations; intervascular pits small, crowded, with lenticular orifices; vessel-ray pits small, half-bordered. Rays heterogeneous; uniseriate, few to 30 cells high; cells large and gummy. Wood fibers thick-walled; pits numerous, with elongated slit-like apertures extending beyond the round margins.

Trichilia flava C. DC. in Mart. Fl. Bras. 11, pt. 1: 203. *pl. 59.* 1878. *Chibo-caspi.*

Forest tree, from 20 to 40 feet in height. Crown open. Trunk straight, round, from 6 to 10 inches in diameter, and either branching from near the base or undivided up to 17 feet. Bark reddish brown, fairly smooth; inner bark separates into coarse flakes.—Fairly common; in dry loam among shrubs and low trees of second growth (alt. 3,500 ft.); reported also by Riedel near the Mamore River, Matto Grosso, Brazil.

Wood pale yellow, in some specimens with light brown streaks; odorless and tasteless; fairly straight-grained; moderately fine- or medium-textured; of medium weight; not difficult to work, takes a smooth finish, and holds its place well. Growth rings absent. Parenchyma in wavy, irregular, broken or fairly continuous, concentric lines. Pores small; few and well scattered; solitary or in radial multiples of 2–3, seldom in diagonal or tangential pairs; open. Vessel lines appear as long, fine scratches, slightly darker than background. Rays numerous, very fine, and distinguishable only with lens on cross section; indistinct on tangential; of lighter color than adjacent elements and sometimes barely distinguishable with lens on radial surface.

Loreto: Caballo-cocha, *2338*, *2368*(?).—San Martín: San Roque, *7180*.

Trichilia iquitosensis Harms, Notizbl. Bot. Gart. Berlin 10: 248. 1928.

Uncommon, small tree, not exceeding 30 feet in height. Crown spreading. Trunk erect, columnar, slender, and undivided for 6 feet. Bark light to dark brown, with numerous, small lenticels; inner bark and wood beneath bark chocolate brown.—In open dry patches in dense forest free from periodical inundations (alt. 450 ft.).

Wood pinkish brown throughout, occasionally with pale yellow patches and fine, dark brown streaks; odorless and tasteless; straight-grained; fairly fine-textured; moderately heavy and strong; not difficult to work, takes a smooth polish, and holds its place well when finished; probably durable. Growth rings present. Parenchyma in numerous, fine, fairly evenly spaced, concentric lines. Pores small; not numerous and well scattered; solitary or in radial multiples of 2; mostly open. Vessel lines fine and slightly darker than background. Rays fine and numerous on cross section; visible only with lens on all surfaces.

Loreto: lower Huallaga, *5139*.

Trichilia Macbrideana Harms, Notizbl. Bot. Gart. Berlin 11: 785. 1933.

Shrub, about 10 feet high. Trunk branching from the base or undivided up to half the height. Bark very dark brown and with numerous, small lenticels. Flowers small, pale yellow; June–July. —Common in the lower Peruvian Amazon; in fairly dense forest or in thickets close to river banks (alt. 350 ft.).

Sapwood constitutes most of the wood, pale pinkish, in some specimens with darker brown streaks; heartwood dark brown. Wood has no distinctive odor or taste; straight-grained; fine-textured; of light or medium weight and rather tenacious; takes a smooth polish with a moderate luster; durable. Growth rings present. Parenchyma in numerous, very fine, broken, concentric lines; faintly discernible with lens on moistened surface. Pores minute or very small; not numerous, scattered; solitary or in radial multiples of 2–3. Vessel lines very fine and barely at limit of vision. Rays numerous and very fine on cross section; scarcely distinguishable with lens on all surfaces.

Loreto: La Victoria, *2524*, *2806*, *2840*.

Trichilia maynasiana C. DC. Monogr. Phan. 1: 700. 1878. *Shatona, Uchu-mullaca.*

Tree, from 15 to 36 feet in height. Crown spreading. Trunk straight, round, from 6 to 12 inches in diameter, and free of limbs up to more than half the entire height. Bark dark brown, that of young trees and branches fairly smooth, in old trees scaly. Flowers small, pale yellow; December–February.—Common in both lowland and upland (alt. 500–1,500 ft.); in open patches in flood-free forest or among low trees of second growth. Timber is used for rough carpentry and general construction.

Sapwood varying in color from pale grayish to light pinkish or yellowish brown, streaked, and darkening on exposure to air; heartwood dark brown. Wood slightly fragrant, but has no distinctive taste; straight- or interlocked-grained; uniformly fine-textured; heavy, compact, and tough; not difficult to work, takes a smooth polish, and holds its place well when finished; liable to be damaged by insects. Growth rings present owing to absence of parenchyma. Parenchyma paratracheal, aliform, in numerous, fine, irregular, broken, tangential lines, and less often in continuous, concentric lines; readily distinguishable with lens on moistened surface. Pores small; not very numerous and well scattered; solitary, in small radial multiples, seldom in small clusters; open or filled with yellowish brown gum. Vessel lines very fine, indistinct or barely at limit of vision. Rays numerous and very fine on cross section; usually visible only with lens on all surfaces, but sometimes barely distinguishable to unaided eye on tangential.

Loreto: lower Huallaga, *3997, 4561, 5294*(?).—San Martín: Morales, *5743;* Tarapoto, *6631, 6777;* Rumisapa, near Tarapoto, *6834.*

Trichilia peruviana C. DC. Monogr. Phan. 1: 654. 1878. *Lechuza-caspi.*

Tree, from 17 to 25 feet in height. Crown open. Trunk erect or moderately so, round, slender, and unbranched up to 10 feet. Bark 0.25 inch thick, reddish brown with a grayish cast and numerous, low, irregular ridges. Fruit round, reddish brown when mature; seeds red; December–January.—Uncommon; in dry medium loam in fairly dense forest (alt. 1,500 ft.).

Sapwood constitutes most of the wood and is well defined, pale ocher-colored with pinkish brown streaks, darkening slightly on exposure; heartwood dark brown. Wood odorless and tasteless;

straight-grained; fine-textured; of medium weight to moderately heavy and rather tenacious; not difficult to work, takes a smooth polish with a moderate luster, and holds its place well when finished; appears to be durable. Growth rings present owing to variation in abundance of parenchyma and depth of color. Parenchyma paratracheal and in widely spaced, broken or continuous, concentric lines or fine bands. Pores very small; numerous, well scattered; solitary, in small radial multiples or rows, seldom in small clusters. Vessel lines very fine, short, and barely at limit of vision. Rays very fine, numerous, and closely spaced on cross section; barely discernible with lens on all surfaces.

San Martín: Tarapoto, *6628*.

Trichilia Riedelii C. DC. in Mart. Fl. Bras. 11, pt. 1: 202. 1878. *Lluillo-caspi, Uchu-mullaca.*

Small, forest tree, from 20 to 35 feet in height, although said to attain greater stature. Crown open. Trunk erect, round or compressed, up to 16 inches in diameter, and free of branches for one-third the entire height. Bark pinkish or reddish brown, fairly smooth; inner bark separates into long, thin flakes.—Not common; in dense, flood-free forest (alt. 500–1,500 ft.); reported previously by Gaudichaud and Riedel respectively from São Paulo and between Sorocana and Ytu, Brazil, also by Spruce from Tarapoto.

Sapwood not well defined, creamy white, turning to yellowish or medium brown on exposure to air; heartwood constitutes most of the wood, pale pinkish brown. Wood odorless and tasteless; straight-grained; uniformly fine-textured; of medium weight to rather heavy; easy to work, takes a smooth polish with a moderate luster, and holds its place fairly well when finished. Growth rings present, but poorly defined. Parenchyma in numerous, very fine, broken, concentric lines, often confluent. Pores small or very small; not numerous, well scattered; mostly solitary, also in radial multiples of 2. Vessel lines very fine, of slightly darker color than background, and barely at limit of vision; lustrous tyloses sometimes present. Rays numerous, very fine, closely and evenly spaced on cross section; visible only with lens on cross and radial sections; indistinct on tangential.

Loreto: Puerto Arturo, lower Huallaga, *5149*.—San Martín: Tarapoto, *6536*.

Trichilia Ruiziana C. DC. Monogr. Phan. 1: 702. 1878. *Uchu-mullaca.*

Tall, forest tree, often 70 feet in height. Crown flat. Trunk erect, compressed, 16 inches in diameter, and unbranched for 22 feet. Bark reddish brown with gray patches, scaly, and 0.5 inch or more thick; inner bark separates into coarse flakes.—Uncommon; in dense, flood-free forest (alt. 500 ft.).

Wood pale ocher-colored throughout with irregular brown gum streaks and pale gray markings; odorless and tasteless; straight-grained; medium-textured; of medium weight, compact, and fairly tough; not difficult to work, takes a smooth, rather dull finish, and holds its place well; fairly durable. Growth rings present. Parenchyma in numerous, irregular, broken, tangential lines. Pores fairly small; moderately numerous and well scattered; solitary or in radial multiples of 2–3; open or filled with grayish white deposit. Vessel lines fairly numerous, fine, and irregularly spaced on cross section; discernible only with lens on all surfaces.

Loreto: Sapote-yaco, lower Huallaga, *4891*.

Trichilia sexanthera C. DC.(?), Notizbl. Bot. Gart. Berlin 7: 501. 1917. *Shatona blanca.*

Uncommon, forest tree, about 55 feet in height. Crown spreading. Trunk erect, columnar, 12 inches in diameter, and undivided for about one-sixth the entire height. Bark grayish brown with a pinkish tinge, and short, vertical ridges; inner bark chocolate brown and coarsely fibrous.—Among tall trees in flood-free area (alt. 500 ft.).

Sapwood pale ocher-colored with a pinkish cast and fine, dark brown streaks; heartwood thin, dark reddish brown. Wood odorless and tasteless; straight- or moderately straight-grained; fine- or medium-textured; fairly light in weight; easy to work and takes a smooth finish. Parenchyma in short, tangential or fairly continuous, concentric lines. Pores very small; not numerous, well scattered; solitary or in radial multiples of 2–3; open or closed. Vessel lines long, fine, and slightly darker than background. Rays very fine, numerous, and barely distinguishable with lens on cross and tangential sections; of reddish brown color and at limit of vision, but inconspicuous, on radial surface.

Loreto: Puerto Arturo, lower Huallaga, *5163*.

Trichilia singularis C. DC. Monogr. Phan. 1: 703. 1878; Mart. Fl. Bras. 11, pt. 1: 217. 1878.

Shrub, from 9 to 18 feet in height. Bark very dark brown or almost black, with numerous, small, interwebbing ridges; inner bark separates into coarse flakes; wood beneath bark dark brown with a

grayish cast.—Fairly common in the lower Peruvian Amazon (alt. 350 ft.); in slightly humid loam forming undergrowth in dense forest; reported also by Gaudichaud from the State of Pará, Brazil.

Sapwood well demarcated, pale pinkish brown with fine, straight, dark brown streaks; heartwood dark brown. Wood has a slightly pleasant odor, but no distinctive taste; straight-grained; moderately fine-textured; of fairly light or medium weight; fibrous, easy to work, and takes a smooth polish. Growth rings present; indicated by bands of terminal parenchyma. Pores fairly small; moderately numerous, well scattered; solitary or in radial multiples of 2–4; open. Vessel lines fine and barely at limit of vision. Rays fine, numerous, and distinguishable only with lens on cross and tangential sections; slightly darker than adjacent elements and at limit of vision on radial.

Loreto: La Victoria, *3114*, *3123*.

Trichilia tocacheana C. DC. Monogr. Phan. 1: 701. 1878. *Lupuna*, *Rifari*.

Medium-sized or tall, forest tree, up to 75, or at times 150, feet in height. Crown spreading. Trunk straight or moderately so, round, from 12 to 28 inches in diameter, clear of limbs up to 52 feet, and with strong, medium-sized or tall buttresses. Bark thin, grayish brown, and fairly smooth; inner bark separates into long flakes. Flowers with creamy white corolla and brown anthers; October–November. Fruit ovoid, yellowish or pale brown, dehiscent; seeds lustrous red.—Common in the lower Huallaga; in slightly humid or dry loam in dense forest free from seasonal floods (alt. 500 ft.). Timber is used for general carpentry.

Wood pinkish or reddish brown throughout, with a pale grayish cast; odorless and tasteless; straight-grained; medium-textured; fairly heavy; easy to work, takes a smooth polish, and holds its place well when finished; durable. Growth rings present, but inconspicuous. Parenchyma in numerous, fine, short, tangential lines often extending from ray to ray. Pores fairly small; not numerous, well scattered; solitary, in radial multiples of 2–4, infrequently in small clusters; mostly open. Vessel lines fine and slightly darker than background. Rays numerous, very fine, and barely discernible with lens on cross and tangential sections; reddish brown, darker than background, and at limit of vision on radial surface.

Loreto: lower Huallaga, *4005*, *4128*, *5354*.

Trichilia Ulei C. DC. Ann. Conserv. & Jard. Bot. Genève 10: 164. 1907.

Rare, forest tree, up to 40 feet in height. Crown spreading. Trunk straight, round, 8 inches in diameter, and unbranched for half the entire height. Bark pinkish to dark brown with grayish patches; inner bark and wood beneath bark dark reddish brown. Fruit ovoid, brown with a grayish tinge; December–January.—In sandy or dry medium loam among low trees and shrubs of second growth (alt. 1,500 ft.). The hard, dense timber is employed for general construction.

Wood pale yellowish brown and darkening on exposure; odorless, but slightly bitter; straight-grained; fine-textured; heavy, compact, and moderately tenacious; not difficult to work, takes a smooth finish, and holds its place fairly well; incorruptible. Growth rings present owing to variation in abundance of elements. Parenchyma paratracheal, also in fine, short, tangential or continuous, concentric lines. Pores very small; numerous, well scattered; solitary or in radial multiples of 2–3; open or partly closed by parenchyma. Vessel lines short, very fine, and barely at limit of vision. Rays numerous and very fine on cross section; distinguishable only with lens on cross and radial sections; indistinct on tangential.

San Martín: Rumisapa, near Tarapoto, *6828*.

Trichilia Williamsii Harms, Notizbl. Bot. Gart. Berlin 11: 387. 1932.

Forest tree, up to 50 feet or more in height. Crown spreading. Trunk erect, columnar, 8 inches in diameter, and undivided for about a third of the entire height. Bark pale green to dark brown; inner bark reddish brown. Flowers white; October–November. Fruit ovoid.—Rare; among tall trees in flood-free area (alt. 500 ft.). Timber is used for beams in house construction.

Sapwood well demarcated, pale pinkish brown; heartwood reddish brown. Wood odorless and tasteless; straight-grained; fairly fine-textured; moderately heavy and tough; easy to work and takes a smooth polish with a golden luster; durable. Growth rings present. Parenchyma in numerous, fine, wavy, broken or continuous, concentric lines. Pores small; few, scattered; solitary or in radial, diagonal, or tangential pairs. Vessel lines fine and faintly distinguishable without lens. Rays fine; distinguishable only with lens on cross and radial sections; indistinct on tangential. Pith pale brown with dark brown specks of gum.

Loreto: Puerto Arturo, lower Huallaga, *5284*, *5353*.

MALPIGHIACEAE. Malpighia Family

Trees or shrubs, often scandent. Leaves usually opposite, entire, dentate, or lobate, often bear glands on the petiole or on the lower surface of the blade, stipulate. Flowers usually perfect and showy, variously arranged. Fruit drupaceous, capsular, nut-like, or of 1–3 samaras. The family is of little economic importance.

Sapwood yellowish, pale pink, or dark red, usually darkening on exposure to air, and with a grayish cast; heartwood pinkish or reddish to dark brown. Wood odorless and tasteless; fairly fine- to medium-textured; of medium weight to heavy; capable of taking a smooth, sometimes lustrous, polish; durable. Parenchyma indistinct or readily visible as irregularly spaced, broken or concentric bands, often enveloping the pores and sometimes appear to indicate limit of growth rings. Pores of small or medium size; fairly numerous or numerous and well scattered; solitary, in multiples or rows, or in clusters; frequently filled with calcium deposit or lustrous tyloses. Rays numerous, evenly spaced, moderately fine to rather distinct on cross section; indistinct on tangential; very distinct at times in *Byrsonima* and occasionally in *Bunchosia*.

Vessels with simple perforations; intervascular pits often numerous, with round or polygonal margins, and slit-like or "screwhead" type of apertures; vessel-ray pits very numerous, small, half-bordered. Rays heterogeneous in *Bunchosia*, at times showing a tendency to homogeneous; uniseriate or partly biseriate in *Spachea*, 2–4 cells wide in *Bunchosia* and *Byrsonima*, and few to about 60 cells high. Wood fibers thick-walled or fairly thick-walled, sometimes septate and with simple pits. Long strands of calcium oxalate crystals common in *Spachea*.

1. BANISTERIA L.

Shrubs or woody vines. Leaves opposite, entire; stipules minute, deciduous. Flowers in umbels, infrequently in panicles or racemes; calyx 5-lobed.

Banisteria Caapi Spruce ex Griseb. in Mart. Fl. Bras. 12, pt. 1: 43. 1858. *Ayahuasca, Caapi.*

Woody twiner, sometimes cultivated in the lowland, preferably in slightly alkaline soil. Spruce (Notes of a Botanist on the Amazon and Andes 2: 413–425. 1908) states that the species grows along "the river Uaupes, the Icanna, and other tributaries of the Rio Negro, where it is commonly planted in *rocas* or mandioca plots;

also at the cataracts of the Orinoco and on its tributaries, on the Napo and Pastasa, and about the eastern foot of the equatorial Andes." The lower part of the stem and its leaves are crushed and boiled in water. When sufficiently triturated, the infusion is passed through a sieve to remove fibrous material, and to the residue water is added to render it drinkable. The resulting greenish brown infusion has a disagreeable, bitter taste and is said to contain narcotic properties.

Loreto: near Iquitos, *3741, 8111, 8224;* upper Itaya, *3348, 3523* —herbarium material only.

Banisteria quitensis Ndzu. Gen. Banisteria 1: 10. 1900; Pflanzenr. IV, 141: 427. 1928. *Ayahuasca, Bejuco-bravo.*

Scandent shrub, common in clearings or dense forest and sometimes cultivated. As in the case of *B. Caapi* the stem and leaves are boiled in water and the resulting infusion is greatly esteemed by the Indians.

Loreto: lower Itaya, *33a*—herbarium material only.

2. BUNCHOSIA Rich.

Small trees or erect shrubs, with short-stalked, entire leaves. The yellow flowers are arranged in racemes or small panicles in the axils of the leaves. Fruit red or orange-colored, 2–3-lobed drupe. Sometimes cultivated for their edible fruit, but the timbers are not of local economic importance.

Sapwood creamy yellow or pale brown; heartwood sometimes well defined, chocolate brown. Wood usually without distinctive odor or taste; moderately straight-grained; fairly fine- or medium-textured; of light or medium weight; easy to work. Parenchyma paratracheal and in broken, tangential or concentric bands, frequently uniting the pores. Pores small; moderately numerous; solitary, in radial rows or multiples, or in clusters. Vessel lines fine. Rays fine, but sometimes visible without lens on cross section; usually invisible to unaided eye on tangential and radial surfaces.

Bunchosia elliptica Tod. Ind. Sem. Hort. Pan. 38. 1877. *Ciruelo, Ciruelo de la China.*

Shrub or small tree, up to 12 feet or more in height. Crown open or conical. Trunk straight, round, slender, and branching 2 or 3 feet from the base. Bark light green or pale brown, with numerous, small, anastomosing fissures. Flowers yellow; June–August.—Widely

distributed in the lowland (alt. 380–500 ft.), and often cultivated for its fruit, which is red when mature and edible.

Wood creamy yellow or pale brown; odorless and tasteless; straight- or interwoven-grained; fairly fine- to medium-textured; light in weight, but firm; easy to cut. Growth rings present, but poorly defined; visible owing to some variation in abundance of parenchyma, which is paratracheal and in broken, tangential or concentric bands uniting the pores. Pores small; not very numerous, well scattered; solitary or more often in short, radially disposed rows. Vessel lines of same color as background and indistinct. Rays moderately fine, lighter-colored than background, and barely at limit of vision on moistened cross section.

Loreto: Caballo-cocha, *2127;* Puerto Arturo, lower Huallaga, *5007*.

Bunchosia Hookeriana Juss. Arch. Mus. Par. 3: 337. 1843.

Small tree, from 18 to 27 feet in height. Crown open. Trunk straight or bent, round, slender, and branching a few feet from the base. Bark yellowish or light tan to dark green, smooth or with small scales. Fruit pinkish red, small, and round; January.—Not common; in dry medium or heavy loam, among shrubs or low trees (alt. 1,400–1,800 ft.).

Sapwood sharply demarcated, creamy yellow; heartwood chocolate brown. Wood fragrant when freshly cut, but tasteless; straight-grained or moderately so; medium-textured; of medium weight to rather heavy; not difficult to work and takes a smooth finish. Growth rings distinct owing to difference in depth of color incident to absence of parenchyma. Parenchyma paratracheal and in numerous, irregularly spaced, concentric bands, of lighter color than background and at limit of vision. Pores small; fairly numerous, well distributed; mostly in small radial rows or small clusters, less frequently solitary. Vessel lines fine, of same color as background, but faintly discernible without lens. Rays fine, numerous, slightly sinuous, of same color as parenchyma, and barely at limit of vision on moistened cross section; indistinct without lens on other surfaces.

San Martín: Puca-yaco, Tarapoto, *6063;* Lamas, *6436*(?).

3. BYRSONIMA Rich.

Erect or small to medium-sized trees, with a fleshy drupe, not separating. They are common along the borders of swamps and

form the understory of high forest growth in both lowland and upland. Their timbers are of some local value, being used mostly for general carpentry and fuel.

Sapwood pinkish gray to dark red, often darkening on exposure to air and with a grayish cast when dried; heartwood sometimes well defined, grayish or dark brown. Wood medium-textured; of medium weight to heavy; sometimes fibrous, easy to work, and highly lustrous; durable. Parenchyma indistinct. Pores fairly small to rather large; numerous or fairly numerous and well scattered; solitary or in radial multiples or rows; often filled with calcium or lustrous tyloses. Rays fine or fairly distinct on cross section; distinct or very distinct on radial surface; specks of dark brown gum often present in cells and readily visible on tangential.

Vessels with simple perforations; intervascular pits numerous, with hexagonal margins and "screwhead" type of apertures. Rays heterogeneous; 2–4 cells wide and up to 20 cells high. Wood fibers fairly thick-walled.

Byrsonima coriacea (Sw.) HBK. Nov. Gen. & Sp. 5: 147. 1822.

Tree, 45 feet tall. Crown spreading. Trunk straight, round, slender, and clear of limbs for 18 feet. Bark dark chocolate brown, with few, fairly coarse lenticels. Fruit small, ovoid, with white calyx cup; July–August.—Uncommon; in open patches in flood-free forest (alt. 400 ft.).

Wood pale brown when fresh, reddish or medium brown with a grayish tinge when dried; odorless, but slightly astringent; straight- or wavy-grained; medium-textured; of medium weight; easy to work and takes a moderately smooth finish; checks in drying. Growth rings absent or present. Parenchyma indistinct. Pores fairly small; moderately numerous, uniformly distributed; mostly solitary or in radial multiples, seldom in rows, of 2–5. Vessel lines fine, short, of same color as background, and visible without lens in proper light; calcium deposit or lustrous tyloses common. Rays fairly broad, but visible only with lens on cross section, also on tangential; darker than adjacent elements and rather distinct on radial surface.

Loreto: La Victoria, *2997*.

Byrsonima fluminensis Ndzu. Gen. Byrsonima, pt. 2: 43. 1901. *Murushi.*

Tree, from 45 to 80 feet in height. Crown open. Trunk fairly round, from 14 to 18 inches in diameter, and bifurcating a few feet

from the base or undivided for 12 feet. Bark pinkish to dark brown, with coarse, shallow fissures. Flowers with pinkish red corolla and yellow filaments; June–July.—Of limited distribution; in slightly humid loam along bank of lagoon (alt. 400 ft.).

Wood pale brown and darkening to reddish brown after long exposure; odorless and tasteless; straight- or irregular-grained; medium-textured; of fairly light or medium weight; easy to cut, takes a moderately smooth finish; checks in drying; appears to be immune to stain and resistant to insect attacks. Growth rings present owing to some variation in abundance of elements. Parenchyma indistinct. Pores barely at limit of vision; numerous, well distributed; mostly in radial multiples or rows of 2–4, less frequently solitary; open. Vessel lines fine and short; grayish calcium deposit common. Rays fairly fine, evenly spaced, and visible only with lens on cross section; barely distinguishable without lens on moistened radial surface.

Loreto: Caballo-cocha, *2348*, *2500*.

Byrsonima spicata (Cav.) Rich. Ann. Mus. Par. 18: 481. 1811. *Indano, Indano colorado.*

Tree, from 35 to 45 feet in height. Crown flat, round, or open. Trunk straight or fairly so, round, 9 inches in diameter, and unbranched for from 5 to 24 feet. Bark pale gray to medium brown, rough; inner bark dark chocolate brown. Leaves elliptic-lanceolate, attenuate at base, lustrous above, puberulent and opaque or glabrous below. Flowers yellow; January–February. Fruit small, round, pale brown, and edible when mature.—Fairly common in the upland (alt. 1,500–3,500 ft.); in sandy or dry medium loam among shrubs and low trees of secondary growth. Timber used in some localities for door-frames and general carpentry.

Sapwood pale pinkish brown or sometimes almost white; heartwood reddish brown. Wood odorless and tasteless; straight-grained; medium-textured; heavy or fairly heavy; fibrous at times, easy to work, takes a moderately smooth finish, holds its place well; durable. Growth rings absent or poorly defined. Pores at limit of vision; numerous or fairly numerous, uniformly distributed; in radial multiples, seldom rows, of 2–3, less frequently solitary; open. Vessel lines short and of same color as background. Rays numerous and fairly broad, but visible only with lens on cross section; barely discernible to unaided eye on radial surface.

San Martín: Tarapoto, *5805*, *6677;* San Roque, *6989*.

4. SPACHEA A. Juss.

Spachea tricarpa A. Juss. Arch. Mus. Par. 3: 329. 1843.

Shrub, 9 feet or more tall. Crown conical. Trunk straight and slender. Bark pale yellow or light brown, fairly smooth.—In slightly humid loam in dense forest (alt. 380 ft.); reported also from the upper Brazilian Amazon.

Wood pale pinkish brown throughout; odorless, but bitter to taste; straight-grained; fairly fine- to medium-textured; of medium weight; rather tough and compact; easy to work and takes a fairly smooth polish; probably durable. Growth rings present. Parenchyma in irregular, fine lines extending between the rays and in concentric bands which appear to indicate limit of growth rings. Pores of small or medium size; not numerous, well scattered; solitary or in small radial multiples, seldom in short rows or clusters. Vessel lines fine, of same color as background, but visible when held to proper light. Rays numerous, evenly spaced; distinguishable only with lens on cross and radial surfaces; indistinct on tangential.

Vessel perforations simple or show tendency to scalariform; intervascular pits with round margins and slit-like or "screwhead" apertures. Rays heterogeneous; uniseriate or biseriate in part. Long crystal strands of calcium oxalate common. Fibers fairly thick-walled.

Loreto: Caballo-cocha, *2243*.

DICHAPETALACEAE. Dichapetalum Family

1. TAPURA Aubl.

Tapura guianensis Aubl.(?), Pl. Guian. 1: 126. *pl. 48*. 1775.

Tree of the upland region, about 55 feet in height. Crown spreading. Trunk straight, round, from 9 to 15 inches in diameter, and unbranched up to 35 feet. Bark yellow or light gray, smooth or with few, small lenticels. Leaves alternate, glabrous, ovate. Flowers small, sessile, with yellow, persistent calyx lobes; December–January.

Sapwood yellowish white when fresh, turning to pale brown on exposure; heartwood grayish or pinkish brown. Wood has no distinctive odor or taste; heavy and hard; straight-grained or fairly so; medium-textured; not easy to work and takes a smooth, dull polish; moderately durable. Growth rings present owing to absence or variation in abundance of parenchyma. Parenchyma metatracheal; in very numerous, fine, short lines extending from ray to ray;

producing a hoary effect when seen under lens. Pores small or moderately small; not very numerous, uniformly distributed; in radial multiples of 2–5 or solitary; open. Vessel lines short, fine, but visible to unaided eye owing to light brown specks of gum present. Rays very numerous, fine, and faintly discernible with lens on cross section; indistinct on tangential; sometimes distinguishable to aided eye on radial surface.

Vessel perforations either simple and elliptical or scalariform with fairly numerous, thin bars. Rays heterogeneous; 1–4, sometimes up to 10, cells wide, these irregularly arranged. Wood fibers thick-walled and with very small lumina.

San Martín: Tarapoto, *6554*.

VOCHYSIACEAE. Vochysia Family

1. VOCHYSIA Juss.

Vochysia Haenkeana Mart. Nov. Gen. & Sp. 1: 147. *pl. 89.* 1826. *Goma amarilla.*

Small tree of the upland, up to 36 feet in height. Crown spreading; twigs and small branches dark lustrous brown. Trunk bent, round, 7 inches in diameter, and unbranched for 15 feet. Bark rufous brown and occasionally with light green patches, fairly smooth. Wood exudes a translucent, viscid resin when cut. Leaves opposite, entire, leathery, yellowish green above, brownish green beneath, and with prominent midrib. Flowers small, yellow, zygomorphic, racemose. Capsule chocolate brown, about 1 inch long.—Not widely distributed; in sandy or heavy loam among shrubs and low trees of second growth (alt. 1,300–1,800 ft.).

Sapwood pale brown with grayish streaks, well defined; heartwood dark red, pinkish, or purplish brown and thin. Wood odorless, but has a slightly bitter taste; straight-grained; medium- or rather coarse-textured; of fairly light or medium weight; easy to plane, takes a smooth polish; fairly durable. Growth rings present owing to arrangement of parenchyma and variation in abundance of elements. Parenchyma paratracheal and in numerous or fairly numerous, irregular, tangential lines uniting the pores, sometimes in concentric bands limiting growth rings (variation noted in different specimens); lighter-colored than background and at limit of vision. Pores rather large and discernible without lens; few or moderately few, well scattered or at times show a tendency to concentric alinement; solitary and round in outline, less frequently in radial mul-

tiples of 2–3, also in small clusters; open or closed. Vessel lines long, not distinct; often filled with grayish white deposit; vessel segments visible with lens. Rays rather broad, lighter-colored than adjacent fibers, and at limit of vision on cross section; distinguishable also without lens on tangential; darker than background and conspicuous on radial. Vertical canals, gummosis type, present.

Vessel perforations simple.

San Martín: Tarapoto, *6155;* Lamas, *6491.*

EUPHORBIACEAE. Spurge Family

One of the largest families of plants, composed of trees, shrubs, or herbs, sometimes twining or climbing, often with a sweet or acrid milky juice. Leaves commonly alternate and simple. Flowers mostly small and unisexual, with or without petals. Fruit most often a 3-celled capsule. The most important members of this group in Peru are: *Hevea,* which yields the Pará rubber of commerce and is now grown extensively in plantations in the East Indies; latex-yielding trees and shrubs of the genus *Sapium; Croton* and *Jatropha,* the seeds of which yield croton oil; cassava root, as in other tropical American regions the staple food of the natives, furnished by *Manihot utilissima* Pohl.; and *Ricinus communis* L., the seeds of which yield castor oil.

Woods exhibit a wide variation in their physical properties and structure. In color they vary from oatmeal, whitish, yellowish, to pale brown, often streaked or with a grayish cast; heartwood sometimes well defined, reddish or dark brown; fine- or moderately fine- to coarse-textured; light and soft to fairly heavy and strong; often fibrous, saw woolly or require a sharp knife to cut smoothly across the grain; mostly perishable and subject to stain in drying. Parenchyma not very abundantly developed; arranged in characteristic, very fine, often numerous, irregular or frequently very closely spaced, tangential or concentric lines such as are commonly found in the order Malvales; sometimes indistinct even with lens. Pores of medium size or large, infrequently small; few or fairly numerous; mostly solitary, also in multiples or rows and in some species in clusters; open or filled with gum, calcium deposit, or tyloses. Rays mostly fine or fairly fine on cross section; indistinct on tangential; sometimes distinct on radial surface. Large radial canals, often distinct, occur in species of *Alchornea, Croton, Mabea,* and *Sapium.*

Vessels, as a rule, have simple perforations; vessel-parenchyma pits half-bordered or with transitions to large, irregular, simple pits. Rays heterogeneous; 1–3 cells wide, seldom more, and few to 75 cells or more high. Wood fibers thick-walled, often provided with a mucilaginous layer, while the thin-walled ones are frequently septate.

1. ACALYPHA L.

Herbs, shrubs, or small trees. Leaves alternate, long-stalked, usually crenate, with stipules. Flowers monoecious, in long or short spikes; pistillate flowers subtended by dentate foliaceous bracts. Fruit a small 3-celled capsule. The genus is represented locally by a number of species of little economic importance.

Wood variegated light brown, yellowish, or grayish, and often with lavender-colored streaks; fairly lustrous; fine- or medium-textured; of light or medium weight; inclined at times to saw woolly, but easy to work; some species durable. Parenchyma not abundantly developed; in indistinct or barely distinguishable concentric bands. Pores of medium size; fairly numerous, evenly distributed or inclined to zonate arrangement; solitary or less often in small multiples; open. Rays fine to fairly broad on cross section; sometimes visible on tangential; distinct on radial.

Vessel perforations exclusively simple; intervascular pits large; vessel-ray pits simple to half-bordered. Rays heterogeneous; 2–3 cells wide.

Acalypha cuneata Poepp. & Endl. Nov. Gen. & Sp. 3: 22. 1845.

Small, glabrous tree or tall shrub, up to 18 feet in height. Crown spreading. Trunk straight, cylindrical, slender, and clear of branches for more than half the height. Bark thin, pale pinkish to dark brown with a grayish cast, scaly. Leaves obovate-oblong, acuminate, cuneate-cordate at base, remotely serrate, glabrous above, and pubescent beneath. Flowers yellowish white. Fruit a glabrous capsule. Wood has no local application.

Wood pale brown throughout; interlocked-grained; of medium weight and moderately hard; fairly easy to work; not durable. Growth rings distinguishable owing to variation in depth of color.

Loreto: lower Huallaga, *5134*.

Acalypha diversifolia Jacq. Hort. Schoenb. 2: 63. *pl. 244.* 1797. *Yana-varilla.*

Slender shrub or small tree, about 10, at times up to 20, feet in height. Branches slender and horizontally disposed. Bark

moderately thin, pale brown or violet to dark reddish brown, and fairly smooth. Leaves short-stalked, lance-oblong to oblong-elliptic, long-acuminate, obtuse at base, crenate-serrate, finely pubescent or nearly glabrous. Flowers white, both kinds in slender catkin-like spikes; October–November.—Common in the lower and middle Huallaga regions and at San Roque (alt. 600–3,500 ft.); in thickets, clearings, or along margin of forest; reported also from La Merced and Posuso and in forest along Río Perene, Department of Junín (alt. 1,900 ft.).

Sapwood light brown with a grayish cast, occasionally with pinkish or dark streaks, and lustrous when held to proper light; heartwood pale to dark brown, thin. Wood has no distinctive taste, but slightly fragrant when fresh; straight- or interlocked-grained; uniformly fine-textured; of light to medium weight, firm, and hard; takes a smooth finish. Growth rings at times fairly distinct owing to variation in depth of color. Parenchyma indistinct. Pores minute or small; rather numerous, with a tendency to ring-porous; solitary or in radial rows or multiples of 2–4, infrequently diagonally disposed; mostly open. Vessel lines fine; occasionally filled with white or dark deposits. Rays numerous, fine, the larger barely distinguishable to unaided eye on cross section; indistinct on tangential and radial.

Loreto: lower Huallaga, *4391*, *4756*.—San Martín: Tarapoto, *6025;* San Roque, *7059*.

Acalypha macrophylla Ule, Verh. Bot. Ver. Brandenb. 50: 79–80. 1908. *Yana-ocuera de oyada.*

Slender tree, up to 30 feet in height. Crown open. Trunk bent, cylindrical, from 5 to 8 inches in diameter, and clear of limbs up to one-fourth the height. Bark moderately thin, grayish to dark purplish brown, and with numerous small lenticels. Leaves membranaceous, elliptic-ovate. Inflorescence in spikes; the pistillate flowers terminal, staminate lateral; petals reddish violet; November–December. —Common in the lower Huallaga (alt. 450 ft.); in thickets, clearings, or along margin of forest growth.

Sapwood pale yellow or light brown with a grayish cast, occasionally with darker brown areas; heartwood dull grayish brown. Wood of medium weight, fairly hard, and strong; saws rather woolly; appears to be durable.

Loreto: Puerto Arturo, lower Huallaga, *5185*.

Acalypha macrostachya Jacq. Hort. Schoenb. 2: 63. *pl. 245.* 1797. *Yana-vara.*

Small, slender tree, not exceeding 27 feet in height. Crown spreading. Trunk straight, slender, round, and clear of branches up to two-thirds the height. Leaves long-stalked, membranaceous, closely pubescent or glabrescent, cordate or short-subcuneate at base. Flowers in axillary spikes, greenish white; November–December. Capsule about 1 inch broad, subglabrous; seeds very small.—Common in the lower Huallaga region (alt. 500 ft.); in slightly humid land along margin of forest. Wood not used locally.

Sapwood almost white when fresh, but soon changes on exposure to yellowish brown with grayish or dark streaks; heartwood pale gray. Wood moderately soft, but strong; easy to work, saws woolly, and takes a lustrous finish; not durable.

Loreto: Puerto Arturo, lower Huallaga, *5124.*

2. ALCHORNEA Swartz

Trees or shrubs. Leaves stalked, usually toothed. Flowers dioecious or monoecious, in lateral spikes or racemes. Fruit a 2–3-celled capsule. The members of this genus are of unattractive appearance and their timber is little used locally.

Wood yellowish or grayish white to pale brown; heartwood sometimes well defined, reddish to dark brown. Wood medium- or coarse-textured; light and soft; fibrous and requires a sharp knife to cut smoothly across grain; perishable. Parenchyma poorly developed; in very fine, indistinct lines. Pores of medium size or large; fairly numerous and with no definite arrangement; solitary, less often in multiples, seldom in small rows or clusters; open or infrequently closed. Rays fine, closely and evenly spaced on cross section; indistinct on tangential; barely visible without lens in proper light on radial surface. Large radial canals present.

Vessel perforations exclusively simple; vessel-ray pits large, simple to half-bordered. Rays heterogeneous; uniseriate.

Alchornea castaneifolia (Willd.) Juss. Tent. Euph. 42. 1824. *Yaco-chihua.*

Small, glabrous tree, from 15 to 20 feet high. Crown open. Trunk straight and slender. Bark thin, grayish or dark purplish brown. Leaves narrowly oblongate, abruptly acuminate at apex, rounded or acute at base, dentate or remotely serrate, and with minute stellate hairs beneath. Capsule globose; maturing in April–May.—Com-

mon in the vicinity of Iquitos (alt. 400 ft.); in inundated land or along banks of streams. Wood employed locally for fuel.

Sapwood lustrous pale brown with a grayish cast; heartwood thin, grayish to dull chocolate brown. Wood has no distinctive taste or odor; straight-grained; medium-textured; light and soft. Growth rings distinct owing to variation in color. Parenchyma in numerous, very fine, broken lines, scarcely distinguishable with lens, infrequently in more distinct concentric bands. Pores barely visible; not numerous, well distributed; solitary or, less often, in radial multiples of 2–6. Vessel lines shallow, but rather coarse and prominent; tyloses often present. Rays fine, numerous, and evenly spaced on cross section; indistinct on tangential and radial.

Loreto: near Iquitos, *496*.

Alchornea glandulosa Poepp. & Endl. Nov. Gen. & Sp. 3: 18. *pl. 221*. 1845.

Small or medium-sized tree, from 20 to 45 feet in height. Crown spreading. Trunk straight, columnar, from 7 to 10 inches in diameter, and branching near the base. Bark thin and variegated in color from yellowish to mottled violet brown. Leaves elliptic-ovate, acuminate, acute at base, serrate. Flowers yellow, dioecious, pedicellate; November–December.—In second growth along the banks of the Paranapura River, lower Huallaga (alt. 450 ft.). Wood is not employed locally.

Sapwood lustrous pale yellow or light brown with darker brownish streaks; heartwood thin, dull chocolate brown. Wood light or moderately so, firm, and strong for its weight; straight-grained; medium-textured; easy to cut, saws slightly woolly; does not appear to be durable.

Loreto: Yurimaguas, *3899*, *4621*.

Alchornea triplinervia Muell. Arg. in DC. Prodr. 15, pt. 2: 909. 1862. *Alchornea brevistyla* Pax & K. Hoffm. *Mojarra.*

Small tree, up to 28 feet in height. Crown subround or spreading. Trunk straight, round to moderately so, from 6 to 10 inches in diameter, and unbranched for from 2 to 10 feet. Bark medium to fairly dark chocolate brown, with irregular, dark brown, shallow fissures and small, black lenticels. Twigs and leaves covered with minute stellate hairs. Fruit small, round, and red when mature; March–April.—Fairly common in the lowland; in dry loam in old clearings or along edge of forest (alt. 400–500 ft.).

Sapwood constitutes most of the wood and varies in color from pale pinkish yellow to deep pinkish brown, sometimes with long dark gum streaks; heartwood medium brown. Wood has no distinctive odor or taste; moderately straight-grained; medium- to rather coarse-textured; light in weight and fairly soft; requires a sharp knife to cut smoothly across grain, but takes a moderately smooth finish; does not appear to be durable. Growth rings absent or poorly defined. Parenchyma indistinct or visible as short, fine lines extending tangentially between the rays. Pores at limit of vision; solitary or in radial multiples or rows of 2–4; open. Vessel lines short or fairly long, darker than background, and readily visible without lens; dark brown specks of gum and lustrous tyloses very abundant. Rays closely spaced and visible with lens on cross section; faintly discernible with lens on tangential; barely at limit of vision on radial.

Loreto: near Iquitos, *7988;* upper Itaya, *3540;* San Ramón, lower Huallaga, *4589.*

Alchornea triplinervia var. **crassifolia** Muell. Arg. in DC. Prodr. 15, pt. 2: 909. 1866. *Cocopano, Mojarra.*

Small or medium-sized tree of the lowland, not exceeding 45 feet in height. Crown spreading. Trunk moderately straight, cylindrical, from 10 to 14 inches in diameter. Bark moderately thin, yellowish to violet brown with a grayish cast, fairly smooth or with coarse, vertical fissures; inner bark coarsely fibrous. Leaves alternate, long-stalked, ovate, acuminate, acute to rounded at base, subcoriaceous, dentate, lustrous. Flowering in October. Capsule pale brown when mature; ripening in October.—Fairly common; in dry cut-over land or in thickets (alt. 400–500 ft.); previously reported from Peru by Ruiz and Pavón. Wood is not used locally for any particular purposes.

Sapwood varying in color from almost white to lustrous pale yellow or pinkish brown, occasionally with darker streaks; heartwood dull brown. Wood has a slightly offensive odor and astringent taste; straight-grained; medium- or rather coarse-textured; light in weight and moderately soft; requires a sharp knife to cut smoothly across grain.

Loreto: Caballo-cocha, *2162, 2186;* near Iquitos, *7972, 7980.*

3. APARISTHMIUM Muell. Arg.

Aparisthmium cordatum (Juss.) Baill. Adansonia 5: 307. 1863–64. *Rucurana.*

Small or medium-sized, slender, deciduous tree, from 24 to 55 feet tall. Crown round. Trunk columnar, erect, rather gnarled, and clear of branches for from 7 to 22 feet. Young branches and peduncles yellowish. Bark thin, smooth, dark reddish or chocolate brown. Leaves long-stalked, coriaceous-membranaceous, ovate, cuspidate-acuminate at apex, obtuse or truncate-obtuse at base. Flowers greenish white, short-stalked, and appear when the tree is leafless. Capsule 3-lobed, green; seeds ellipsoid; May–June.—Abundant in lowland; along margin of or in dense forest growth (alt. 380–450 ft.). Wood used for fuel only.

Sapwood thick, pale pinkish brown with a light grayish or almost white tinge; heartwood dull brown. Wood tasteless, but has a spicy odor when fresh; straight- or interwoven-grained; uniformly fine- or medium-textured; of moderately light weight to rather heavy, strong, compact, and resilient; saws rather woolly, but takes a smooth finish with a moderate luster; liable to check in drying. Growth rings present owing to variation in depth of color and absence of parenchyma. Parenchyma in exceedingly fine, numerous, short, unevenly spaced, tangential lines. Pores appear as small pinpoints; fairly numerous, well distributed; solitary and ovoid in outline, but more frequently in radial, sometimes tangential, multiples or rows of 2–3, less frequently 4–7 or occasionally up to 10, or in small clusters. Vessel lines appear as broad, but not conspicuous, shallow scratches. Rays fine and evenly spaced on cross section; indistinct, but faintly visible, on tangential; distinguishable to unaided eye on radial.

Vessel perforations simple or show a tendency to scalariform; vessel-ray pits simple. Rays heterogeneous; uniseriate.

Loreto: lower Nanay, *356;* upper Nanay, *645, 649;* La Victoria, *2582.*

4. CLEIDION Blume

Cleidion amazonicum Ule, Verh. Bot. Ver. Brandenb. 50: 76. 1908.

Shrub, up to 18 feet tall. Bark pale or dark reddish brown, thin, and smooth. Leaves short-stalked, obovate, penninerved, chartaceous.—Uncommon; in closed growth or along banks of streams (alt. 450 ft.); reported also from the lower Jurua, State of Amazonas, Brazil.

Wood pale yellowish white throughout and fairly lustrous; odorless and tasteless; straight- or interlocked-grained; uniformly fine-textured; light in weight and soft; easy to work and saws slightly

woolly. Growth rings present owing to variation in depth of color. Parenchyma readily distinguishable as numerous, fine, sinuous, fairly evenly spaced, concentric lines. Pores small or sometimes barely discernible without lens; not numerous, uniformly scattered; solitary and ovoid in outline, less frequently in radial multiples of 2–9, seldom in small clusters; mostly open. Vessel lines short, fine, and indistinct. Larger rays barely at limit of vision on cross section; indistinct on tangential; of same color as the surrounding elements, but sometimes distinguishable to unaided eye on radial surface.

Vessel perforations exclusively simple; vessel-ray pits simple. Rays heterogeneous; uniseriate.

Loreto: Paranapura, lower Huallaga, *5272*.

5. CROTON L.

Herbs, shrubs, or trees with stellate or scurfy pubescence. Leaves alternate, often heart-shaped, entire or serrate. The greenish or white flowers are arranged in racemes, the pistillate flowers near the base of the raceme, the staminate above. Fruit a 3-lobed capsule; seeds smooth.

Sapwood oatmeal-colored or grayish to light brown; heartwood dark brown. Wood sometimes has a spicy odor when freshly cut; medium- to coarse-textured; light and soft or of medium weight; fairly or highly lustrous; inclined to saw woolly; not durable. Parenchyma paratracheal, also aliform, confluent, and in irregular lines or fine bands extending between the rays; producing a hoary effect when seen under lens. Pores of medium size to large; fairly numerous and evenly distributed; solitary, less often in multiples, rows, or in clusters; open. Rays fine or fairly fine on cross section; indistinct on other surfaces. Large radial canals present.

Vessels with simple perforations; vessel-ray pits simple. Rays heterogeneous; uni- or biseriate.

Croton cuneatus Klotzsch in Hook. Lond. Journ. Bot. 2: 49. 1843; Mart. Fl. Bras. 11, pt. 2: 89. 1873. *Puma-sacha.*

Small or medium-sized tree, up to 40, rarely 55 to 60, feet in height. Crown spreading. Trunk at times bent, cylindrical, from 8 to 14 inches or more in diameter, and clear of branches up to 25 feet. Bark grayish or purplish brown and secretes a small quantity of red resin. Leaves obovate-lanceolate or cuneate-obovate, long-petiolate, entire or remotely dentate. Inflorescence in long racemes at the tip of the branches; flowers small; June–August. Fruit a

bilobed capsule, speckled light brown when mature; seeds flattened, triangular, brownish black.—In open patches in second growth, frequently in humid loam along banks of streams or lagoons (alt. 450 ft.). Wood employed for fuel only.

Sapwood variegated in color from pale yellow or almost white to light brown, highly lustrous; heartwood dark brown. Wood tasteless when fresh, but has a spicy odor suggesting cinnamon; straight- or irregular-grained; medium-textured; light or moderately heavy, firm; easy to work; not durable. Growth rings fairly distinct in some specimens owing to variation in depth of color. Parenchyma indistinct or barely distinguishable with lens; paratracheal and in fine, broken, tangential lines uniting the pores. Larger pores at limit of vision; not numerous, fairly uniformly scattered; solitary or in radial multiples of 2–5; open. Vessel lines short and readily discernible against the lighter-colored background; brown gum or lustrous tyloses frequently present. Rays fine and faintly distinguishable with lens on cross section; indistinct on tangential; sometimes discernible without lens on radial surface.

Loreto: lower Nanay, *524;* upper Nanay, *983;* Caballo-cocha, *2272;* upper Itaya, *2343, 3300.*

Croton glabellus L. Syst. ed. 10. 1275. 1859.

Tall shrub or small, slender tree, seldom exceeding 25 feet in height. Crown spreading. Trunk straight, round, and free of branches for 4 feet or so. Bark pale yellow or light brown, fairly smooth. Leaves oblong-ellipsoid or oblong-ovate, entire. Flowers small, white, fragrant, in axillary racemes; October–November. Capsule oblong-globose; seeds brown, smooth.—Not common; in open patches or thickets and along margin of forest (alt. 600–1,500 ft.). Wood is not used locally.

Sapwood almost white, pale yellow, or light brown; heartwood dull brown. Wood has a pleasant spicy odor when fresh; straight-grained; medium-textured; saws slightly woolly; tends to check in drying; liable to be damaged by insects.

Loreto: Puerto Arturo, lower Huallaga, *5070.*

Croton matourensis Aubl. Pl. Guian. 2: 879. *pl. 338.* 1775. *Yurac-siprana.*

Tree, up to 80 feet or more in height. Crown spreading. Trunk straight, round, from 20 to 30 inches in diameter, and free of branches for about 10 feet. Young branches and petioles covered with dark

reddish, stellate hairs. Leaves glabrous above and densely covered with small scales beneath. Racemes aggregated near the tip of twigs. Capsule subglobose.—Common in the lower Huallaga (alt. 500 ft.); in open, dry, medium loam. Wood is used for general construction.

Sapwood uniform pale yellow and turning to light brown on exposure, highly lustrous; heartwood dark purplish brown. Wood light, firm, and strong for its weight; saws slightly woolly and holds its place well when finished. Pores often filled with dark brown or black gum.

Loreto: Yurimaguas, *4711*.

Croton palanostigma Klotzsch in Hook. Lond. Journ. Bot. 2: 48. 1843. *Sangre de dragón.*

Tree, often attaining a height of 45 feet. Crown spreading. Trunk straight, round, from 8 to 12 inches or more in diameter, and clear of limbs for one-third the height. Bark grayish or reddish brown, about 0.5 inch thick; sapwood and bark exude a copious quantity of bitter, dark reddish brown resin (hence the local name "dragon's blood"), which is employed in the treatment of fractures. Inflorescence in long racemes. Capsule depressed-globose.—Restricted in its distribution; in second growth along rocky banks of streams (alt. 1,400 ft.). Wood is used for kindling only.

Wood light brown when fresh, grayish and occasionally with light brown areas when dried; medium- or coarse-textured; moderately light in weight, but firm; saws rather woolly and takes a smooth finish with a silvery luster. Parenchyma visible to unaided eye; paratracheal and in fine, undulating, fairly evenly spaced lines uniting the pores. Pores distinguishable as fine pinholes; tyloses frequently present. Vessel lines short, rather coarse, and prominent against the lustrous background; dark gum often present. Rays thinner than the parenchyma lines, but discernible to unaided eye on cross section.

San Martín: Tarapoto, *5844*.

6. HEVEA Aubl.

Trees, with milky juice. Leaves alternate, long-stalked, 3-foliolate. Flowers small, white or yellowish white, in panicles. In normal years, the trees bloom about the middle of the dry season while the fruits mature during the corresponding period of the wet season. The smaller trees or those growing along margins of forest or in clearings flower earlier than the taller trees or those growing in

dense forest. Capsule 3-sulcate, splitting up into three 2-valved cocci exploding at maturity, scattering the seeds and fragments of the woody valves; seeds oblong or subglobose and smooth. Ducke, in his revision of the genus (Archiv. Inst. Biol. Veget. 2, no. 2: 217–246. 1935) gives a full account of its distribution in tropical America. The genus is chiefly important as the source of a yellowish or white latex, the Pará rubber of commerce. The timber, however, is of only secondary value.

Wood whitish or pale brown, often with dark grayish streaks, and fairly lustrous; medium- or coarse-textured; light and soft to medium in weight; requires a sharp knife to cut smoothly across grain; perishable. Parenchyma metatracheal; in fine, tangential or concentric lines forming a network with the rays. Pores large; few and scattered irregularly; solitary or in radial multiples; open or filled with dark gum or calcium deposits. Rays moderately fine on cross section; sometimes fairly distinct on tangential; distinct on radial surface; dark gum present in cells and readily visible with lens on both tangential and radial sections.

Vessels with simple perforations; vessel-ray pits simple to half-bordered. Rays heterogeneous; 1–3 cells wide.

Hevea brasiliensis (HBK.) Muell. Arg. Linnaea 34: 204. 1865–66. *Jebe débil muerto, Siringa mapa.*

Tree, from 50 to 80 feet or more in height. Crown fairly round or spreading. Trunk straight, cylindrical, up to 30 inches in diameter, and clear of limbs for from 30 to 45 feet. Twigs grayish white, pubescent. Bark pinkish or dark brown, scaly. Leaflets lanceolate-elliptic, acute-acuminate or cuspid-acuminate at apex, acute at base, membranaceous. Flowers axillary, small, white; May–June. Fruit 3-seeded; seeds oblongate.—Rather abundant throughout the lowland, but not in any pure or extensive stands; in dense forest in slightly humid or flood-free areas, often in the vicinity of streams (alt. 350–600 ft.). Wood is not used locally. The yellowish sweet latex obtained by making incisions in the bark furnishes the Pará rubber of commerce. The trees are tapped by means of a small implement, *rasqueta*, the incisions taking the form of either V-cuts or oblique lines. The first tapping is made at a height of 5 or 6 feet, subsequent tappings at intervals of approximately 2 inches below the first incision, until the base of the trunk is reached. The latex exuding is collected in tin cups or pails and coagulated by pouring successive layers of latex on a pole revolved in the smoke of a palm-nut fire.

The process is continued until a large ball or "loaf" is formed. The interior of a fresh loaf is white, but after long exposure it turns black. (For further notes see page 48.)

Wood pale yellow throughout, usually with extensive grayish or dark brown areas or streaks; odorless and tasteless; straight-grained; medium-textured; light in weight to moderately so, firm; easy to work and takes a smooth, highly lustrous finish; not durable. Growth rings indistinct. Parenchyma in numerous, fine, broken or continuous lines forming a network with the rays. Pores distinguishable without lens; few and well distributed; solitary or in radial multiples of 2–5; open or closed. Vessel lines fairly coarse and usually readily distinguishable on account of brown or black gum present. Rays of about the same thickness as parenchyma lines, evenly spaced, slightly sinuous, and distinguishable only with lens on cross section; discernible, but not conspicuous, on tangential and radial surfaces.

Loreto: upper Nanay, *889*.

Hevea brasiliensis var. **janeirensis** Pax, Pflanzenr. IV. 147: 121. 1910. *Jebe débil fino, Siringa.*

Tree, from 80 to 90 feet tall. Crown spreading. Trunk straight, cylindrical, 25 inches or more in diameter, and clear of branches for 27 feet. Bark pinkish or chocolate brown, with short vertical and transverse ridges. Leaflets membranaceous, elliptic, acute at base, glabrous, lustrous dark green above, grayish green beneath, petiolulate. Flowers small, yellowish white; buds creamy white; August–September.—Fairly common in the lowland; in dense forest usually close to banks of streams (alt. 380 ft.). As in the case of *H. brasiliensis*, the latex secreted in abundance when the bark and sapwood are cut furnishes the Pará rubber of commerce.

Sapwood not distinctly demarcated, pale yellow with extensive dark grayish streaks or wide bands caused by sapstain; heartwood dull light brown. Wood light in weight, but strong and firm. In comparison with *H. membranacea*, parenchyma is more widely spaced and not as distinct, pores of about the same size and abundance, the vessel lines coarser, longer, and frequently filled with dark gum. Rays barely discernible without lens on tangential; darker than background on radial.

Loreto: La Victoria, *2931;* near Iquitos, *8071*(?).

Hevea membranacea Muell. Arg. in Mart. Fl. Bras. 11, pt. 2: 299. 1874. *Siringa.*

Tree, from 100 to 150 feet or more in height. Crown spreading. Trunk straight or moderately so, cylindrical, 32 inches in diameter, and clear of branches for half the entire height. Bark dark brown, coarsely fissured, and yields an abundance of latex, which coagulates readily and turns pink on exposure to light. Leaflets narrowly obovate, acuminate at apex, attenuate at base, glabrous, slender-stalked. Flowers pale yellow or white; August.—Scattered throughout the lowland forest, especially near the Javary River, which forms the boundary between Peru and Brazil (alt. 400 ft.).

Wood white, pale yellow, or light brown with slaty gray streaks; slightly heavier than the other species. Growth rings visible owing to some variation in depth of color and arrangement of elements. Pores usually distinguishable without lens; open or closed. Vessel lines short or long and prominent owing to dark brown or black gum present. Rays distinguishable only with lens on cross and tangential sections; occasionally discernible to unaided eye on radial.

Loreto: Caballo-cocha, *2503*.

Hevea microphylla Ule, Bot. Jahrb. 35: 669. 1905. *Siringa.*

Tree, up to 145 feet in height. Crown fairly round or open. Trunk straight or moderately straight, round, up to 36 inches in diameter, and unbranched for 50 feet. Bark pale brown, fairly smooth or with numerous small scales, and exudes when incised a copious quantity of sweet latex.—Fairly common in some areas in the lowland; in forest subject to periodical inundations or in the vicinity of streams (alt. 400 ft.).

Wood creamy yellow or pale pinkish brown with extensive grayish patches and irregular dark brown striping; fairly straight- or irregular-grained; medium- or rather coarse-textured; light in weight, but firm and strong; easy to work, takes a moderately smooth finish; likely to check in drying; perishable. Growth rings present owing to absence or variation in abundance of parenchyma, which is in numerous, broken or continuous, concentric lines or bands. Pores at limit of vision; not very numerous, well scattered; solitary or in radial multiples of 2–4, sometimes up to 7, seldom in tangential pairs; infrequently closed. Vessel lines usually darker than background owing to black gum present. Rays fairly fine, numerous, of lighter color than adjacent elements, and visible only with lens on cross section; invisible or distinguishable to aided eye on tangential; sometimes slightly darker than the surrounding elements and barely at limit of vision on radial surface.

Loreto: Río Masán, lower Itaya, *206*.

7. HURA L.

Hura crepitans L. Sp. Pl. 1008. 1753; DC. Prodr. 15, pt. 2: 1229. 1866. *Catahua.*

Glabrous tree, up to 100 feet in height, with stout limbs. Crown spreading or conical. Trunk erect, columnar, from 20 to 70 inches in diameter, and clear of branches up to 30 feet; the lower part armed with stout, conical spines. Bark pale yellow or grayish brown, with shallow ridges; inner bark fibrous; a bitter, turbid latex exuding from incisions in the bark is reputed to be injurious to eyesight and is employed locally as fish poison. Leaves, in size and shape, resemble those of cottonwood (*Populus deltoides* Marsh.), dull on both surfaces, and the veins prominent on the under side. The dark red flowers, borne in the form of a cone, are rather conspicuous on account of their profusion. Capsules concave at both ends, deeply sulcate, and when ripe burst with considerable violence, liberating the wafer-like seeds.—The species has a wide distribution in northeastern Peru in both the lowland and upland (alt. 400–2,200 ft.); in open dry or humid loam or in the vicinity of watercourses. Wood is used for crating, general carpentry, and construction.

Wood pale yellow or dark brown, often with grayish streaks; odorless, but slightly astringent; straight- or roey-grained; medium- or coarse-textured; light in density or moderately so, firm, and strong for its weight; saws slightly woolly, easy to work, and takes a smooth finish; susceptible to stain in drying and to damage by insects. Growth rings indistinct or faintly visible owing to slight variation in abundance of parenchyma. Parenchyma in numerous, very fine, short, tangential lines extending between the rays and producing a network pattern on cross section. Pores at limit of vision; not numerous or fairly numerous; solitary or in radial multiples of 2–4, infrequently tangentially disposed; mostly open. Vessel lines rather fine or coarse, short or long; often filled with tyloses or dark gum. Rays fine and distinguishable only with lens on cross section; faintly discernible without lens on moistened tangential; slightly darker than adjacent elements on radial surface.

Vessels with simple perforations; intervascular pits rather large and numerous, with rounded or hexagonal margins and lenticular orifices; vessel-ray pits large, rounded, simple to half-bordered. Tyloses thin-walled. Rays heterogeneous to homogeneous; uniseriate or biseriate in part, few to 20 cells high, and cells thin-walled

and rather large. Wood fibers thin-walled, with simple or indistinctly bordered pits.

Loreto: lower Itaya, *111;* Caballo-cocha, *2303;* Yurimaguas, *4243.*—San Martín: Tarapoto, *6318.*

8. JATROPHA L.

Jatropha Curcas L. Sp. Pl. 1006. 1753. *Piñón.*

Shrub, or small, slender tree, from 10 to 20 feet high. Crown open. Trunk straight, cylindrical, and branching 2 or 3 feet from base. Bark pale yellow or light purplish brown, papery, and secretes when cut a translucent, astringent juice. Leaves entire or shallowly 3–5-lobed, nearly glabrous, and with long petioles. Flowers greenish yellow, in long-stalked cymes. Fruit drupe-like, fleshy, and with large, oblong-ellipsoid seeds with prominent black striation, and contains a high percentage of an odorless oil used for soap, as a lubricant, and in domestic medicine.—Common in both the lowland and upland and often cultivated (alt. 380–1,800 ft. or more); in dry loam in clearings.

Sapwood variable in color from yellowish white to pale brown with extensive grayish stain; heartwood brown, perishable. Wood light and soft; straight-grained; medium- or coarse-textured; requires a sharp knife to cut smoothly across grain and saws woolly. Growth rings absent or indistinct. Parenchyma in numerous, fine lines, extending between rays and scarcely discernible with lens. Pores of medium size; few; solitary or more frequently in radial multiples of 2–5, occasionally in tangential pairs; mostly open. Vessel lines fine, short, and of same color as background. Rays distinguishable with lens on all surfaces.

Vessel perforations simple; vessel-ray pits large and crowded. Rays heterogeneous; uni- or biseriate and low.

Loreto: Pinto-cocha, middle Nanay, *816;* Pebas, *1582;* Leticia, near Peruvian-Brazilian border, *3062;* herbarium material collected also at Fortaleza, lower Huallaga, and at Tarapoto, San Martín.

9. MABEA Aubl.

Shrubs or small to medium-sized trees. Leaves alternate, short-stalked, penninerved. Flowers in terminal panicles. Capsule globose; seeds ovoid, smooth. Timber is not of local economic importance.

Wood of various shades of light brown, ranging from yellowish or grayish to cocoa brown; medium-textured; of medium weight to heavy; easy to work, fairly lustrous; durable. Parenchyma metatracheal; in indistinct, irregularly spaced, concentric lines. Pores of medium size; not numerous, diffuse; solitary or less often in radial multiples or rows of 2; mostly open. Rays fine, numerous, and closely spaced on cross section; indistinct on tangential; fairly distinct on radial surface. Large radial canals present.

Vessels with exclusively simple perforations; intervascular pits numerous, small, and crowded; vessel-ray pits simple to half-bordered. Rays distinctly heterogeneous; uniseriate.

Mabea subsessilis Pax & K. Hoffm. Pflanzenr. IV. 147, pt. 5: 282. 1912. *Amaquillo, Manchinga blanca.*

Tree, from 14 to 45 feet tall. Crown spreading or flat. Trunk erect, fairly round, from 5 to 10 inches in diameter, and clear of branches up to two-thirds the entire height. Bark dark purplish or reddish brown, fairly smooth, and exudes when incised a small quantity of tasteless latex. Leaves membranaceous, glabrous, and serrate. Flowers yellow or pale red, in panicles. Capsule round, 1-seeded; seeds lustrous black, oily, edible, and have a bland taste; May.—Uncommon; in sandy loam in old clearings or along margin of forest (alt. 500 ft.). Wood used for fuel only.

Wood pale brown throughout; straight- or interlocked-grained; uniformly fine-textured; of medium weight, dense, and hard; capable of taking a smooth, fairly lustrous finish; durable. Growth rings occasionally present. Parenchyma in fine, sinuous, broken or continuous, concentric bands; not prominent. Pores small; not numerous; solitary or in small radial multiples or rows; mostly open. Vessel lines fine and indistinct. Rays distinguishable with lens on cross and tangential sections; barely at limit of vision on moistened radial.

Loreto: lower Nanay, *653;* upper Nanay, *896.*

10. MAPROUNEA Aubl.

Maprounea guianensis Aubl. Pl. Guian. 2: 895. 1775. *Airana, Arean.*

Medium-sized, glabrous tree, up to 45 feet tall. Crown spreading or round. Trunk straight or bent, cylindrical or fluted, from 9 to 15 inches or more in diameter, and free of branches for more than half the entire height. Bark 0.5 to 1 inch thick, russet or dark brown, scaly. Leaves short-stalked, membranaceous. Fruit small, globose,

reddish when mature; seeds dark brown; October–November.—The species is characteristic of the plain of Tarapoto; in sandy or heavy loam among shrubs and low trees of secondary growth, also on hill slopes (alt. 1,300–1,600 ft.). Wood is used rather extensively around Tarapoto for house construction and general carpentry.

Wood pale brown with creamy white streaks and dark purplish brown striping; odorless and tasteless; moderately heavy to heavy, fairly hard, and strong; straight- or irregular-grained; medium-textured; moderately easy to work and holds its place well when finished; susceptible to stain in drying. Growth rings absent or visible on account of alinement of parenchyma. Parenchyma in numerous, fine, short, fairly evenly spaced, irregular or continuous, concentric lines. Pores small or medium-sized and at limit of vision; fairly numerous, well distributed; in radial multiples or rows of 2–4, less frequently solitary or in small clusters; mostly open. Vessel lines short, fine, and faintly discernible without lens; tyloses common. Rays numerous and very fine on cross section; distinguishable with lens on all surfaces.

Vessels with simple perforations. Rays heterogeneous; uniseriate or biseriate in part.

San Martín: Tarapoto, *5899, 5900;* Lamas, *6380, 6470.*

11. PERA Mutis

Pera sp.(?) *Machusacha mapichi.* Tree, up to 45 feet in height. Crown spreading. Trunk erect, round, from 8 to 12 inches in diameter, and unbranched for half the entire height. Bark pale green or light gray to reddish brown, fairly smooth, and thin. Flowers small, white; December–January.—In dry loam along edge of path in fairly dense forest (alt. 1,500 ft.).

Wood uniform pale brown throughout; odorless and tasteless; straight-grained; medium-textured; of medium weight to fairly heavy; easy to work; does not stain in drying and is immune to insect attacks. Growth rings present owing to alinement of parenchyma, which is in indistinct, concentric bands. Pores of fairly small or medium size; not numerous, well scattered; solitary, infrequently in radial or diagonal multiples of 2–3; open. Vessel lines fairly fine, of same color as or slightly darker than background, and visible to unaided eye. Rays moderately fine, lighter-colored than background on cross section; visible only with lens on cross and tangential sections; faintly discernible without lens on moistened radial.

San Martín: Tarapoto, *6089.*

12. PHYLLANTHUS L.

Trees, shrubs, or herbs. Leaves alternate, entire, usually 2-ranked. Flowers very small, green, commonly solitary or clustered in the leaf axils. Fruit baccate or more commonly a 3-celled capsule. The timbers are used locally to some extent for heavy construction and in the manufacture of furniture.

Sapwood yellowish to pinkish brown; heartwood sometimes well defined, dark brown. Wood medium-textured; of medium weight to heavy; inclined to be brittle and fibrous, easy to work, and takes a moderately lustrous polish; fairly durable or durable. Parenchyma sparingly developed; indistinct or visible as very fine lines extending between the rays. Pores of medium size; fairly numerous to numerous, well distributed; solitary or less frequently in small multiples or rows; open. Rays fine or moderately fine on cross section; indistinct on tangential; sometimes fairly distinct on radial surface.

Vessel perforations exclusively simple; intervascular pits small to fairly large. Rays distinctly heterogeneous; 1–3 cells wide and often high.

Phyllanthus grandifolius L. Sp. Pl. 981. 1753. *Gallinazo-panga.*

Small tree, from 12 to 22 feet high, with long, drooping branches and round crown. Trunk straight, round, from 5 to 10 inches in diameter, and either branching from near the base or clear of limbs up to more than three-fourths the entire height. Bark pale brown, fairly smooth or with low ridges. Flowers small, pale yellow; October–November. Fruit appressed, green when mature.—Fairly common in the lower Huallaga, in fairly dense forest, also in secondary growth on the plain of Tarapoto (alt. 450–1,500 ft.). Timber seldom used for any particular purpose.

Wood creamy yellow, becoming purplish or dark brown when dried, and with no sharp demarcation between sap and heart; wavy-grained; medium-textured; light or moderately light in weight, but firm and strong; easy to work, takes a smooth finish, and holds its place well. Growth rings present or indistinct. Parenchyma not distinguishable with lens. Pores fairly small or sometimes barely at limit of vision; rather numerous, well scattered; most frequently in radial multiples of 2–5, seldom more, less frequently tangentially disposed, solitary, or in small clusters; open or closed. Vessel lines of same color as background; tyloses or grayish white deposit frequently present. Rays faintly distinguishable to unaided eye on

moistened cross section; of darker color than adjacent elements and sometimes producing a silver grain on radial. Pith septate; in young wood pale yellow, in older wood light to dark brown.

Loreto: lower Huallaga, *4831, 5190.*—San Martín: Rumisapa, near Tarapoto, *6762.*

13. SAPIUM Jacq.

Glabrous trees or shrubs, usually with copious milky juice. Leaves alternate, stalked. Flowers monoecious, in terminal or lateral spikes. Fruit a globose or pear-shaped capsule; seeds nearly globose. Timber is suitable for boxes, crates, general carpentry, and paper pulp.

Wood whitish to yellowish brown, usually with dark gray streaks caused by stain; odorless and tasteless; coarse- or very coarse-textured; light, soft or fairly firm; fibrous and requires a sharp knife to cut smoothly across grain; perishable. Parenchyma paratracheal and in numerous fine lines or bands extending between the rays; sometimes indistinct. Pores large; few, scattered irregularly or showing a slight tendency to zonate arrangement; solitary or infrequently in small multiples; open. Rays fine or moderately fine, numerous, and closely spaced on cross section; sometimes barely discernible on tangential and radial surfaces.

Vessel perforations exclusively simple; intervascular pits numerous, large, and with elongate-lenticular orifices. Rays heterogeneous; uniseriate or biseriate in part. Wood fibers with simple pits.

Sapium Hippomane G. F. W. Meyer, Prim. Fl. Esseq. 275. 1818. *Gutapercha.*

Tall, forest tree, at times attaining a height of 120 feet. Crown spreading. Trunk straight, cylindrical, 21 inches or more in diameter, unbranched for about half the entire height, and with strong buttresses 4 feet high. Bark yellowish white or brown, with coarse ridges; secretes when cut a fair quantity of sweet, pinkish latex. Leaves elliptic or oblong-lanceolate. Flowers small, white; June–July. Capsule globose.—In dense, flood-free forest (alt. 400 ft.); said to grow in the Department of Huánuco at an elevation of approximately 5,000 feet.

Wood pale yellow or light brown with extensive dark gray streaks; tasteless, but has a slightly fetid odor; straight-grained; coarse-textured; requires a sharp knife to cut smoothly across grain, easy to work; checks and liable to stain in drying; not durable.

Growth rings absent. Parenchyma indistinct. Pores of medium size or large and readily visible; not very numerous, well scattered; in radial multiples of 2–5, less frequently solitary or in small clusters; open. Vessel lines coarse, short or moderately long. Rays visible with lens and wavy on cross section; indistinct on tangential; of same color as background and faintly discernible with lens on radial surface.

Loreto: La Victoria, *2865*.

14. SECURINEGA Comm.

Securinega congesta Muell. Arg. in Mart. Fl. Bras. 11, pt. 2: 76. 1873.

Small tree or tall shrub, about 20 feet in height, with terete branches. Bark grayish or dark brown. Leaves ovate-lanceolate, membranaceous. Flowers monoecious. Fruit a small capsule, brownish black; April–May.—Common in the lowland (alt. 350–400 ft.); in dry loam along margin of and in dense forest.

Sapwood uniform pinkish brown, occasionally with darker brown streaks; heartwood dark chocolate brown. Wood straight- or interwoven-grained; uniformly fine-textured; light in weight, but firm and compact. Growth rings poorly defined. Parenchyma indistinct. Pores very small; numerous and well scattered; solitary or in small radial multiples or rows. Vessel lines of same color as background, indistinct. Rays few and irregularly spaced on cross section, faintly visible with lens; indistinct on other surfaces.

Vessel perforations exclusively simple. Rays heterogeneous; up to 4 cells wide; crystals of calcium oxalate common in cells, especially on radial surface.

Loreto: Caballo-cocha, *2234;* herbarium material collected also at La Victoria and near Iquitos.

ANACARDIACEAE. Cashew Family

Trees or shrubs, with resinous juice. Leaves alternate, simple or pinnate. Flowers minute or small, whitish or greenish, in axillary or terminal panicles. Fruit superior, usually fleshy, and containing a single seed. The family is represented by about 58 genera, confined mostly to the warmer parts of the globe. Some of the members furnish edible fruits of economic value, others are the sources of oils and gums, many are commercially important for their tannins and dyes, while some of the timbers are either of commercial or of local value.

The woods of this group exhibit a wide range of variation in their physical properties. That of *Spondias* is light in weight, coarse-textured, and with a dull whitish or grayish color; the wood of *Astronium* is hard and heavy, and sometimes dark reddish brown or cherry red variegated with black streaks; the quebracho, *Schinopsis*, of Argentina has a uniform reddish color and is one of the hardest and most durable of woods known. The principal structural characters of the Peruvian woods are as follows: Parenchyma not abundantly developed; mostly paratracheal, sometimes aliform or confluent; very fine and indistinct to fairly distinct. Pores of variable size, but mostly large and distinct in *Anacardium*, *Mangifera*, and *Spondias;* uniformly distributed; solitary or in multiples; sometimes filled with gum or tyloses. Rays fine on cross section in *Anacardium*, *Astronium*, *Mangifera*, and *Mauria*, or broad in *Spondias* and *Tapirira;* usually invisible without lens on tangential and radial surfaces. Small radial canals are common in the rays in *Spondias* and *Tapirira;* in the last they are visible under lens as black dots on tangential surface and as dark lines on radial.

Vessel perforations are mostly simple and circular or elliptical. Pits between vessels and ray or wood parenchyma cells are characteristically large, simple or half-bordered, sometimes elongated and so arranged as to resemble scalariform perforation. The rays are heterogeneous, but infrequently in *Spondias* show some tendency to homogeneous; uniseriate or partly biseriate in *Anacardium*, *Astronium*, *Mangifera*, and *Mauria*, 1–3 cells wide in *Tapirira*, and 2–3, sometimes up to 6 or more, in *Spondias*. Wood fibers have simple pits and are sometimes septate.

1. ANACARDIUM L.

Anacardium occidentale L. Sp. Pl. 383. 1753. *Caju, Cashew, Casu, Marañón.*

Small, evergreen tree or shrub, of wide distribution and cultivated extensively in northern Peru, as in other tropical American regions, for its characteristic fruit, the cashew-nuts of commerce. Crown spreading. Bark reddish brown and yields a gummy exudation. Leaves subleathery, nearly glabrous, obovate, rounded at apex, and short-stalked. Flowers in large terminal panicles, yellowish or purplish, and fragrant. Fruit consists of a large, grayish, reniform nut borne at the apex of an enlarged, yellow or red hypocarp. The latter resembles a bullnose pepper and has a juicy flesh with an agreeable flavor. The nut is edible when roasted and its outer coat

is the source of anacardic acid and of a caustic oil, cardol, similar to that of bitter almonds. Timber is used to a limited extent for boxes and crates.

Sapwood grayish or pinkish brown; heartwood lustrous reddish brown. Wood straight-grained; medium- or fairly coarse-textured; moderately hard, heavy, and strong; easy to work, takes a lustrous finish; not resistant to decay. Growth rings fairly distinct in some specimens. Parenchyma paratracheal. Pores moderately small to fairly large; uniformly distributed; solitary or in small radial, seldom tangential, multiples; open. Vessel lines short and rather prominent. Rays fine and barely distinguishable to unaided eye on cross section; slightly darker than background on tangential; and producing a golden sheen on radial surface; uni- or biseriate.

Loreto: lower Nanay, *400, 483;* near Iquitos, *1388;* Caballococha, *2183.*—San Martín: Tarapoto, *5548.*

2. ASTRONIUM Jacq.

Small to fairly large trees. Leaves pinnate. Calyx much enlarged and persistent in fruit. Fruit not edible. The "palo de cruz," found in scattered localities in northeastern Peru, is hard, heavy, and durable, and is esteemed for walking sticks, mouthpieces for blowpipes, rollers for crushing sugar cane, and other purposes demanding strength.

Wood variable in color from creamy yellow or pale pink to dark reddish brown, often conspicuously marked with vertical bands of dark brown or black, producing a striking and handsome effect; line of demarcation between sap and heart is often well marked; straight- or cross-grained; medium-textured; not difficult to work and capable of taking a smooth polish. Parenchyma paratracheal, aliform, and sometimes confluent; at times indistinct. Pores moderately small or of medium size; not numerous and well scattered; solitary or in small radial multiples. Vessel lines fairly fine and slightly darker than background. Rays fine and discernible only with lens on cross section; sometimes distinguishable to unaided eye on radial surface. Small radial canals are present in some rays, showing as small black dots on tangential surface; contents oily.

The following numbers have been determined provisionally on the basis of wood specimens:

Loreto: Pebas, *1760, 3186.*—San Martín: Tarapoto, *5851.*

3. MAURIA Kunth

Mauria suaveolens Poepp. & Endl. Nov. Gen. & Sp. 3: 77. 1845. *Ingaina blanca, Itil, Itil blanco, Yurac ingaina.*

Small or medium-sized tree, up to 50, occasionally 60, feet in height. Crown flat or spreading. Trunk erect, columnar, 15 or more inches in diameter, and clear of limbs for about 18 feet. Twigs minutely pubescent. Bark pale gray or dark purplish brown. Leaves subleathery. Flowers white. Drupe subglobular; fruiting in February.—Limited in its distribution to the upland (alt. 1,600–3,500 ft.); either in secondary growth or in dense forest. Timber sometimes used for the construction of huts.

Sapwood yellowish or pinkish brown and highly lustrous; heartwood reddish or dark pinkish brown, sharply demarcated. Wood without distinctive odor or taste; straight-grained; medium-textured; of medium weight, firm, and strong; takes a smooth, lustrous polish and holds its place well when finished. Growth rings absent or present. Parenchyma paratracheal. Pores at limit of vision; fairly numerous, uniformly scattered; solitary or in radial, seldom tangential, multiples of 2–3; open or filled with tyloses. Vessel lines short, fine, but distinguishable to unaided eye. Rays distinguishable only with lens on cross and tangential sections; somewhat darker than adjacent elements, but indistinct, on radial; uni- or biseriate.

San Martín: Lamas, *6408;* San Roque, *7098, 7227.*

4. SPONDIAS L.

Shrubs or moderately small to tall trees, widely distributed in tropical America. Leaves deciduous; leaflets numerous, unequal at the base. Flowers small, in terminal or lateral panicles. Fruit a fleshy, juicy drupe with a large, usually 5-celled, rough stone. The best-known members are *Spondias Mombin* L. and *S. purpurea* L., both of which are planted commonly in the lowland for their plum-like, edible fruits and for shade.

Wood nearly white when fresh, but subject to blue stain; odorless and tasteless; coarse-textured; light in weight and soft to rather firm and tenacious; suitable for box boards if kiln-dried; perishable in the soil. Growth rings sometimes present. Parenchyma in very fine bands surrounding the pores; usually indistinct. Pores of medium size to moderately large; numerous and well scattered; solitary or in multiples; mostly open. Rays broad on cross section and suggest *Ceiba;* indistinct on other surfaces. Small radial canals are present

in association with margins of rays and with wood parenchyma strands.

Rays heterogeneous; 2–6 cells or more wide. Wood fibers thin-walled and septate.

Spondias Mombin L. Sp. Pl. 371. 1753. *Shungu, Ubo, Uvo, Ushun.*

Deciduous tree, from 30 to 90 feet in height. Crown open. Trunk straight or moderately so, fairly cylindrical, up to 28 inches in diameter, clear of branches up to half the entire height, and at times armed with stout spines. Bark reddish brown, about 0.5 inch thick, scaly or with coarse, deep fissures. Leaflets in pairs of 3–8, opposite or subopposite, nearly glabrous, entire or dentate, with long, narrow tips. Flowers small, red, in large terminal panicles; June–August. Fruit yellow.—Frequent in thickets (alt. 350–550 ft.).

Wood creamy yellow, with prominent black streaks and extensive grayish or dark brown areas when dried, not distinctly demarcated into sap and heart; has no characteristic odor or taste; straight-grained; requires a sharp knife to cut smoothly across grain; liable to be damaged by insects. Growth rings present. Pores of medium size or fairly large; uniformly scattered; mostly solitary, also in small radial or diagonal multiples, infrequently in small clusters; open or filled with white or dark brown to black deposits. Vessel lines at limit of vision. Rays lighter-colored than surrounding elements on cross section; distinguishable with lens on tangential; occasionally discernible to unaided eye on radial. Pith pale brown.

Loreto: lower Itaya, *217, 258, 259;* lower Nanay, *408;* Pebas, *1761;* Caballo-cocha, *2156;* La Victoria, *2651, 2857, 3128;* upper Itaya, *3401, 3446;* lower Huallaga, *4437, 4933;* near Iquitos, *8034.*

Spondias purpurea L. Sp. Pl. ed. 2. 613. 1762. *Ajuela, Ciruelo.*

Shrub or small tree, at times up to 30 or 40 feet in height. Crown almost flat; branches few and stout. Trunk straight, round, up to 12 inches in diameter, and unbranched for from 5 to 10 feet. Bark about 0.25 inch thick, pinkish to dark brown, with short, coarse ridges. Leaflets in pairs of 6–11, blunt or rounded at apex, subsessile. Flowers in lateral panicles on old wood, pale red or purplish. Fruit red or purplish when mature.—Fairly common in old clearings in the lowland (alt. 400–500 ft.).

Wood varying from pale yellow with a pinkish cast to light brown with black streaks; has no characteristic odor or taste; straight-

grained; rather coarse-textured; light in weight; requires sharp tools to work; susceptible to insects. Pith reddish or dark brown.

Loreto: lower Itaya, *216;* near Yurimaguas, *4207.*

5. TAPIRIRA Aubl.

Trees or shrubs, widely distributed throughout tropical America. Of the dozen or more species composing the genus, the best known is *Tapirira guianensis* Aubl., a tree of medium height with a wood of good quality and suitable for general carpentry and interior construction.

The woods of the various species differ chiefly in their density. The softer grades are suitable for cheaper construction and miscellaneous purposes, while the harder kinds are of about the consistency of birch (*Betula*). The Peruvian species are medium- or fairly coarse-textured; inclined to be fibrous and take a lustrous polish. Parenchyma paratracheal; indistinct. Pores of medium size; numerous or fairly numerous, diffuse-porous; mostly solitary; open or filled with tyloses. Rays at limit of vision or indistinct without lens. Small radial canals are common in the rays; oily specks caused by exudations from these canals are common on the tangential surface and appear as dark lines on the radial.

Tapirira guianensis Aubl. Pl. Guian. 1: 470. *pl. 188.* 1775. *Isa-paritsi.*

Forest tree, from 30 to 75 feet in height. Crown round or spreading. Trunk straight, columnar, up to 12 inches or more in diameter, sometimes buttressed, and unbranched for from one-third to one-half the entire height. Bark reddish or chocolate brown, fairly smooth or with shallow, vertical ridges. Leaves alternate; leaflets membranaceous, varying in size and shape. Flowers in axillary or terminal panicles, small, yellow with pale greenish tinge, and with short filaments; July–August.—Of limited distribution; in flood-free or periodically inundated forest (alt. 400 feet); the species is said to grow in northern and eastern Brazil where it is known as "páo pombo" (see Timbers of Tropical America 383–384. 1924) and furnishes "a wood of good quality used for general carpentry, interior construction, and to some extent in boat-building." Aublet (l.c.) describes the species as a tall tree with a trunk up to 40 or 50 feet in height and 2 or 3 feet in diameter. "It has at its summit a large number of branches, those in the center erect and the lateral ones horizontal." The Carib name is "tapiri."

Wood pinkish brown with grayish streaks, not sharply defined into sap and heart; has no distinctive odor or taste; straight-grained or fairly so; medium-textured; light in weight, soft, and fibrous to moderately hard and tenacious; easy to work and takes a good polish with a moderate luster; fairly durable. Growth rings present, but inconspicuous; visible owing to slight differences in color. Pores at limit of vision; fairly numerous, evenly distributed; solitary, in radial multiples of 2–3, seldom in small clusters. Vessel lines fine, darker than background, and distinguishable to unaided eye. Rays fairly numerous; distinguishable with lens on cross and tangential sections; at limit of vision, but not prominent, on radial.

Loreto: lower Nanay, *652;* near Iquitos, *3649;* Yurimaguas, lower Huallaga, *3828.*

Tapirira myriantha Triana & Planch.(?), Ann. Sci. Nat. V. 14: 295. 1872.

Tree, approximately 60 feet in height. Crown flat. Trunk moderately straight, round or slightly compressed, 15 inches in diameter, and unbranched for more than a third of the entire height. Bark yellowish or reddish brown, smooth or with few, long, low ridges; exudes when incised a small amount of oily or resinous fluid.—Not common; in dense, flood-free forest (alt. 500 ft.); Record (Timbers of Tropical America 383. 1924) states that the species is known from the Choco Province on the Pacific Coast of Colombia and from the coast of San Blas in Panama.

Sapwood not distinctly demarcated, pinkish brown; heartwood grayish brown. Wood straight-grained; of medium weight and firm; slightly fibrous, not difficult to work, and takes a smooth, dull finish; checks in drying; probably durable. Growth rings present, but poorly defined. Pores at limit of vision; fairly numerous, well scattered; solitary, seldom in small radial, diagonal, or tangential multiples. Vessel lines fairly fine, short or long, and slightly darker than background. Rays barely distinguishable with lens on moistened cross section; faintly discernible without lens on tangential; darker than the adjacent elements on radial.

Loreto: lower Huallaga, *4712.*

AQUIFOLIACEAE. Holly Family

Shrubs or small trees. Leaves simple, alternate, often evergreen. Flowers regular, usually dioecious, small, axillary. Fruit a berry-like drupe. They are more valuable for decorative purposes than for their wood.

The microscopic features of the wood of *Ilex* are distinctive; the vessel perforations are scalariform with many bars, and the ground mass is composed of fiber-tracheids with spiral thickenings.

1. ILEX L.

Ilex sp. *Huitoc-quiro, Vitoc-quiro.* Tree, 35 feet in height. Crown dense and spreading. Trunk 7 inches in diameter and bifurcating almost from the base. Bark light gray, fairly smooth or with rather coarse lenticels; inner bark and wood beneath bark dark chocolate brown.—In dry loam among shrubs and low trees of second growth (alt. 3,500 ft.).

Sapwood grayish brown; heartwood medium or pale brown. Wood odorless and tasteless; straight- or irregular-grained; medium-textured; of medium density; easy to cut and takes a fairly smooth finish. Pores of moderately small or medium size; fairly numerous and well scattered; solitary or in radial multiples or rows of 2–3. Vessel lines fine and barely at limit of vision. Rays fine to rather coarse, of light color, and distinct on cross section; visible also without lens on moistened tangential; darker than the surrounding elements and rather conspicuous on radial surface.

San Martín: San Roque, *6995.*

STAPHYLEACEAE. Bladdernut Family

1. TURPINIA Vent.

Turpinia heterophylla (Ruiz & Pavón) Harms & Loes. Bot. Jahrb. 37: 575. 1906. *Yana-mullaca.*

Small tree of the upland forest, about 22 feet in height. Crown dense, spreading. Trunk bent, compressed, slender, and unbranched for about 8 feet. Bark light gray, with low, irregular ridges; inner bark medium brown. Leaves 5-foliolate; leaflets glabrous, elliptic-ovate or ovate-oblong, serrulate or crenate, and almost sessile. Inflorescence in terminal racemes; flowers yellowish white; February–March. Fruit a subround capsule.—Uncommon; in dense, tall growth (alt. 3,500 ft.).

Wood pale brown with darker pinkish brown striping; odorless and tasteless; straight- or moderately straight-grained; medium-textured; of light or medium weight, firm; easy to work, takes a fairly smooth finish, and holds its place well; fairly durable. Growth rings present owing to some variation in depth of color. Parenchyma indistinct. Pores of fairly small or medium size; moderately numer-

ous, evenly distributed; in radial multiples or rows of 2–4, less frequently solitary; open. Vessel lines very fine, of same color as background, and indistinct to unaided eye. The larger rays fairly broad, but invisible without lens or barely at limit of vision on moistened cross section; distinguishable also without lens on tangential; reddish brown and rather prominent on radial surface; small globules of dark brown gum visible with lens on radial section. Pith grayish brown, with darker brown specks of gum.

Vessels with scalariform perforations; intervascular pits elongated; vessel-ray pits simple. Rays heterogeneous; 1–4, seldom 5, cells wide, and up to 50 cells high.

San Martín: San Roque, *7099*.

ICACINACEAE. Icacina Family

1. **PORAQUEIBA** Aubl.

Poraqueiba sericea Tul. Ann. Sci. Nat. III. 11: 172. 1849. *Umarí, Umarí amarillo, Umarí negro.*

Tree, from 45 to 65 feet tall. Crown spreading. Trunk straight, round or moderately so, from 10 to 20 inches in diameter, and unbranched for from 9 to 45 feet. Bark purplish or dark brown, fairly smooth or rough. Flowers small, yellow; July–August. Fruit round, about 2.5 inches in diameter, yellowish with a greenish cast when mature, and contains an oily, edible pulp.—Fairly common in the lowland; in dry loam among shrubs and small trees of second growth or along margin of forest (alt. 380–450 ft.). Timber is used for general carpentry and fuel.

Sapwood pale yellow with light brown markings or uniform pale pinkish brown, well defined; heartwood dark purple, thin. Wood odorless and tasteless; straight- or irregular-grained; medium- or fairly coarse-textured; moderately heavy, strong, and compact; not very difficult to work and takes a smooth, but rather dull polish; liable to check in drying; durable. Growth rings absent or present; when present visible owing to absence of parenchyma. Parenchyma in numerous, fine lines extending tangentially and forming a network with the rays. Pores of medium size to large; few or fairly numerous and well scattered; solitary or less often in multiples. Vessel lines appear as very fine, short lines of same color as background. Rays on cross section appear to be of two sizes: numerous, fine to moderately fine or few, very broad, and distinct, suggesting aggregate or compound rays; indistinct on tangential; occasionally distinct on radial surface.

Vessel perforations mostly scalariform to simple. Rays heterogeneous with a tendency to homogeneous; the narrow rays 2–3 cells wide, the broad rays 20 cells wide. Wood fibers with distinctly bordered pits.

Loreto: Caballo-cocha, *2099;* near Iquitos, *8078, 8080.*

SAPINDACEAE. Soapberry Family

Trees or shrubs, often woody vines, frequently provided with tendrils. Leaves alternate or subopposite, stalked, compound or simple, without stipules. Flowers small, usually white, regular or nearly so. Fruit dry or fleshy. Timbers of no commercial importance, although some of them are useful locally.

Sapwood white to pinkish brown, darkening on exposure to air and subject to a bluish gray stain; heartwood cocoa brown, often perishable. Wood fairly fine- or medium-textured; moderately light, but firm to moderately heavy and durable; sometimes fibrous, easy to work, and takes a lustrous polish. Parenchyma paratracheal and indistinct, also, as in *Cupania* and *Allophylus*, in broken or continuous, closely or irregularly spaced, concentric bands or lines; sometimes distinct and appear to indicate limit of growth rings. Pores small to fairly large; moderately numerous or numerous and well scattered; solitary, in multiples or rows, seldom in clusters; open or closed. Rays very fine and numerous or, as in *Talisia*, fairly broad on cross section; usually not visible to unaided eye on tangential; rather distinct on radial surface.

Vessel perforations exclusively simple; vessel-parenchyma pits half-bordered. Rays homogeneous or tending to heterogeneous; 1–3 cells wide and 2–30 cells high; dark brown gum often present in cells. Square or rhombohedral crystals of calcium oxalate common in parenchyma strands in *Allophylus* and *Cupania.* Wood fibers fairly thin- or thick-walled; pits simple.

1. ALLOPHYLUS L.

Shrubs or trees. Leaves alternate, with 3 leaflets. Flowers small, white, in simple or panicled racemes; sepals and petals each 4; stamens 8. Fruit a small 1-seeded drupe.

Wood whitish, yellowish, pink, or pale brown, with a gray cast or streaked; medium-textured; fairly light to moderately heavy; easy to work and sometimes takes a moderately lustrous polish; fairly durable. Parenchyma paratracheal and indistinct, at times aliform or in broken or continuous, evenly or unevenly spaced, concentric

bands; distinct in some species. Pores of fairly small or medium size; moderately numerous and fairly well scattered; solitary, less often in multiples or in small clusters; mostly open. Rays fine on cross section; sometimes barely discernible on tangential; fairly distinct on radial.

Vessel perforations simple. Rays heterogeneous; uni- or biseriate. Rhombohedral or squarish crystals of calcium oxalate common in parenchyma strands.

Allophylus divaricatus Radlk. in Mart. Fl. Bras. 13, pt. 3: 493. 1900. *Yurac-tortilla-caspi.*

Small to medium-sized tree. Crown open. Trunk straight, cylindrical, from 8 to 12 inches in diameter, and free of branches for from one-half to three-fourths the entire height. Bark thin, fairly smooth, pale pinkish or purplish brown with a greenish cast. Flowers small, yellowish; November–December.—Common on the plain of Tarapoto (alt. 1,400 ft.); in thickets.

Sapwood almost white or pale pinkish brown throughout, occasionally with broad, darker brown streaks; heartwood dark brown or almost black. Wood straight-grained; fine- or medium-textured; light to moderately heavy; easy to work and takes a smooth, fairly lustrous finish.

San Martín: Tarapoto, *5969, 6033, 6137.*

Allophylus floribundus Radlk. in Engl. & Prantl, Nat. Pflanzenfam. 3, pt. 5: 312. 1895. *Shitari-caspi, Shitari-caspi colorado.*

Small tree, from 12 to 35 feet in height. Crown dense, open. Trunk slender, cylindrical, and free of branches up to three-fifths the height. Bark moderately thin, pale grayish brown, and covered with numerous, small fissures. Flowers pale yellowish or white; December–January.—Common; in forest and thickets (alt. 1,300–3,000 ft.). Timber is used locally for general carpentry and fuel.

Sapwood pale pinkish brown with slightly darker streaks; heartwood dark brown or almost black, thin. Wood straight- or roey-grained; uniformly fine-textured; heavy, hard, and firm; easy to work and takes a smooth, fairly lustrous finish; probably durable.

San Martín: Tarapoto, *5453, 6020, 6596;* San Roque, *7007.*

Allophylus leiophloeus Radlk. Sitzber. Bayer. Akad. 38: 214. 1908; Pflanzenr. IV. 165: 503. 1932.

Tree, approximately 55 feet tall. Crown spreading. Trunk straight, fairly round, 10 inches in diameter, and free of branches

for 30 feet. Bark medium or light brown with extensive gray patches and small black lenticels; inner bark coarsely fibrous. Fruit ovoid, borne on the main branches; October–November.—Not common; in dense forest in *altura* (alt. 500 ft.).

Sapwood lustrous pale brown with a pinkish cast; heartwood dark yellowish brown, perishable. Wood odorless and tasteless; straight-grained; medium-textured; fairly light in weight, but firm; easy to work and takes a smooth finish; checks in drying; probably durable. Growth rings present owing to variation in depth of color. Parenchyma indistinct. Pores of medium size; rather numerous and fairly well distributed; solitary, less frequently in radial multiples of 2–4; open or closed. Vessel lines fine, darker than background, and at limit of vision. Rays numerous, fine, and discernible only with lens on cross and tangential sections; of darker color than adjacent elements and visible to unaided eye in proper light on radial surface.

Loreto: Yurimaguas, *4131*, *4657*(?).

Allophylus punctatus Radlk. in Engl. & Prantl, Nat. Pflanzenfam. 3, pt. 5: 312. 1895.

Tree, of small to medium stature. Crown spreading, broad. Trunk bent, up to 12 inches in diameter, and clear of limbs up to half the entire height. Bark yellowish or greenish to dark brown, smooth, and fairly thin. Fruit small, globose, yellow when mature; November–December.—Common in the forest of the lower and middle Huallaga regions (alt. 600–1,500 ft.). Timber used locally for house construction.

Sapwood pale yellowish or pinkish brown; heartwood dark brown, thin. Wood straight-grained; uniformly fine-textured; heavy to moderately heavy, hard, and strong; easy to work, takes a smooth polish with a high luster, and holds its place well when finished; durable.

San Martín: Tarapoto, *5716*, *5864*, *6103*.

Allophylus scrobiculatus Radlk. in Engl. & Prantl, Nat. Pflanzenfam. 3, pt. 5: 312. 1895. *Shimbillo.*

Small tree, seldom exceeding 35 feet in height. Crown spreading. Trunk straight, cylindrical, and slender. Bark light grayish brown, fairly smooth, moderately thin, and with numerous, minute lenticels. Leaves elliptic or oblanceolate, acuminate at apex, acute or oblique at base, glabrous above, and sparsely pubescent beneath. Flowers densely pubescent, in racemes. Fruit brown, obovoid,

and 1-seeded.—Common; in moderately dense growth along banks of streams, also in secondary growth (alt. 380–1,400 ft.). Timber is employed locally for fuel and to a limited extent for general carpentry.

Sapwood uniform pale pinkish or grayish brown and highly lustrous; heartwood yellowish to dark brown, thin. Wood odorless and tasteless; straight-grained; medium-textured; light to moderately heavy, firm, and brittle; saws slightly woolly, but easy to work; does not appear to be durable. Growth rings present owing to alinement of parenchyma. Parenchyma in fine, evenly spaced, tangential or continuous, concentric bands. Pores not distinguishable to unaided eye; fairly numerous and uniformly scattered; solitary, less frequently in radial multiples of 2–3, seldom more; open. Vessel lines fine, but readily distinguishable without lens; crystalline deposit often present. Rays fine and barely discernible with lens on cross section; of darker color than adjacent elements and visible to unaided eye on tangential and radial surfaces, especially when moistened.

Loreto: lower Nanay, *544;* Pebas, *1763;* near Iquitos, *7903.*—San Martín: Tarapoto, *6712.*

2. CUPANIA L.

Shrubs or trees. Leaves alternate, large, pinnate. Flowers small, white, in racemes or panicles; sepals and petals each 5; stamens 7. Fruit a 2–4-lobed capsule, coriaceous or somewhat fleshy; seeds with a conspicuous aril.

Sapwood pinkish brown with a gray tinge; heartwood cocoa brown. Wood medium-textured; of medium density; inclined to be fibrous, but easy to work; fairly durable. Parenchyma paratracheal and indistinct, also in wavy, irregularly spaced, concentric lines, at times indicating limit of growth rings. Pores of medium size to fairly large; not very numerous, well distributed; solitary or in multiples, less often in small clusters; mostly open. Rays fairly fine or very fine on cross section; usually indistinct on tangential; faintly visible without lens on radial surface; homogeneous to heterogeneous; uni- or biseriate. Rhombohedral crystals of calcium oxalate, in short strands, common in parenchyma.

Cupania cinerea Poepp. & Endl. Nov. Gen. & Sp. 3: 38. 1845.

Tree, 57 feet in height. Crown spreading. Trunk straight, round, and 8 inches or more in diameter. Bark dark chocolate brown with abundant pale yellow or whitish deposit. Flowers yellowish brown; December–January.—Uncommon; in dry loam in fairly dense forest of medium-sized trees (alt. 1,500 ft.).

Wood pale pinkish brown with a grayish tinge; odorless and tasteless; straight- or moderately straight-grained; medium-textured; of fairly light or medium weight and firm; not difficult to work and takes a smooth polish with a moderate luster; checks in drying; fairly durable and immune to insects and stain. Growth rings absent. Parenchyma indistinct. Pores of medium size; numerous and uniformly distributed; mostly in radial multiples of 2–4, also solitary; most often filled with yellowish or scarlet brown deposits. Vessel lines numerous, fine, darker than background, and readily visible to unaided eye; lustrous tyloses common. Rays numerous, fairly fine, and discernible only with lens on cross section; slightly darker than background and distinguishable to unaided eye in proper light on moistened radial surface. Pith dirty gray with lustrous or reddish brown gum deposits.

San Martín: Tarapoto, *6023*.

3. MATAYBA Aubl.

Matayba purgans (Poepp. & Endl.) Radlk. in Sitzber. Math. Phys. Akad. Muench. 9: 629. 1879.

Small tree, from 18 to 25 feet tall. Crown spreading. Trunk straight, often fluted, slender, and branching 2 or 3 feet from the base. Bark white, pale yellowish, grayish, to light reddish brown, thin.—Not common; in sandy loam among shrubs or small trees of second growth (alt. 1,500 ft.).

Wood pinkish when fresh, turning to pale reddish brown on exposure, and with no sharp demarcation between sap and heart; straight-grained or moderately so; uniformly fine-textured; fairly heavy and tenacious; not difficult to work, takes a smooth finish with a golden luster, and holds its place well; immune to stain and insects and appears to be durable. Growth rings absent or barely visible owing to slight variation in depth of color. Parenchyma indistinct. Pores small or fairly small; not numerous and well scattered; solitary or in small radial multiples or rows; open or closed. Vessel lines fine, slightly darker than background. Rays barely distinguishable to aided eye on cross section; indistinct on tangential; slightly darker brown than adjacent elements and barely visible without lens on moistened radial surface.

Intervascular pits with slit-like apertures. Rays homogeneous to heterogeneous; uniseriate and 2–15 cells high; dark brown gum common in cells. Wood fibers fairly thin- to thick-walled.

San Martín: Tarapoto, *5889*, *6493*.

4. TALISIA Aubl.

Talisia peruviana Standl. Field Mus. Bot. 11: 165. 1936.

Uncommon shrub, 15 feet in height, with many branches. Trunk divided from the base. Bark pale green or medium brown and fairly smooth. Fruit ellipsoid, green; October.—Forming undergrowth in dense, flood-free forest (alt. 500 ft.).

Wood creamy yellow or pale brown when fresh, pale pink or dark chocolate brown when dried and with extensive dark gray areas; odorless and tasteless; straight-grained; fine-textured; fairly light in weight, but firm and rather tenacious; fibrous, but easy to work and takes a smooth, fairly lustrous polish. Growth rings poorly defined. Parenchyma indistinct. Pores minute or small. Vessel lines fine, invisible or faintly discernible to unaided eye. Rays moderately fine to rather broad, numerous, wavy, lighter-colored than adjacent fibers, and visible without lens on moistened cross section; indistinct on tangential; sometimes visible on radial surface.

Rays homogeneous with a tendency to heterogeneous; uniseriate or biseriate in part, seldom triseriate, and 5–20 cells high. Wood fibers with very thick walls and small lumina.

Loreto: lower Huallaga, *5218*.

SABIACEAE. Sabia Family

1. OPHIOCARYON Schomb.

Ophiocaryon heterophyllum Urban, Ber. Deutsch. Bot. Ges. 13: 221. 1895.

Uncommon shrub, about 9 feet tall, with many branches. Bark pinkish brown and scaly. Flowers bright yellow or pale red; July–August.—In dry loam in thickets (alt. 400 ft.).

Sapwood pale pinkish brown and lustrous; heartwood sometimes well defined, cocoa brown. Wood odorless and tasteless; straight-grained; moderately fine- or medium-textured; light in weight; requires a sharp knife to cut smoothly across the grain, easy to work; checks in drying; not durable. Growth rings absent or indistinct. Parenchyma paratracheal and in fine, evenly and rather closely spaced, concentric lines, forming a network with the rays. Pores of small or medium size; few, inclined to be in isolated groups; solitary, less frequently in radial or diagonal rows of 2, seldom in small clusters; open. Vessel lines fine and of same color as background, but visible without lens. Rays of about the same thickness as paren-

chyma lines on cross section; visible only with lens also on tangential; barely distinguishable to unaided eye on moistened radial surface.

Vessels with simple perforations; vessel-ray pits simple or half-bordered and of about the same size as intervascular. Rays heterogeneous; uniseriate. Rhombohedral crystals of calcium oxalate common in parenchyma strands; dark brown gum also common.

Loreto: near Iquitos, *3719*.

RHAMNACEAE. Buckthorn Family

Trees or shrubs. Leaves simple, entire or toothed, usually provided with stipules. Flowers small and inconspicuous, greenish, perfect or of separate sexes, in axillary cymes or rarely terminal; calyx 4–5-lobed; petals 4–5 or none, often clawed; stamens 4–5, opposite the petals. Fruit 1–4-celled, capsular or drupaceous. Although some of the woods are among the densest known, they are of little or no commercial value.

Woods pale yellow to pinkish or dark brown and often streaked; heartwood sometimes well defined, pinkish, dark red, or purplish brown; fine- or fairly fine-textured; of medium weight to heavy and durable; capable of taking a smooth polish. Parenchyma paratracheal and often indistinct, also in fine, broken, tangential or concentric bands, at times indicating limit of growth rings. Pores small or fairly small; moderately numerous or numerous, diffuse- or ring-porous; solitary or in multiples, seldom in small clusters or small radial rows; sometimes filled with calcium deposit. Rays very fine, numerous, and evenly spaced on cross section; indistinct without lens on tangential; sometimes visible in *Gouania* on radial surface.

Vessel perforations simple; vessel-parenchyma pits half-bordered.

1. GOUANIA Jacq.

Gouania Lupuloides (L.) Urban, Symb. Ant. 4: 378. 1910.

Scandent shrub, with long, trailing branches. Bark light tan and fairly smooth. Leaves alternate, glabrous or nearly so. Flowers small, white, in long, slender racemes. Fruit hard, dry, and furnished with vertical wings; seeds compressed-convex.

Sapwood lustrous pale brown; heartwood pale yellow or medium brown and streaked with gray. Wood odorless and tasteless; straight- or interwoven-grained; fairly fine- or medium-textured; light in weight, but firm; easy to cut. Parenchyma paratracheal, not distinct, also in fine, wavy, broken or continuous, evenly spaced, tangential

or concentric bands. Pores fairly small; numerous or moderately numerous and well distributed; solitary or in small radial multiples, less frequently in tangential pairs or in small clusters. Vessel lines short and barely visible without lens. Rays numerous, very fine or fine, and faintly discernible or invisible with lens on cross section; barely distinguishable to aided eye on tangential; slightly darker than background and sometimes faintly visible to unaided eye on radial surface.

Loreto: Pebas, *1640*.

2. RHAMNIDIUM Reissek

Rhamnidium elaeocarpum Reiss. in Mart. Fl. Bras. 11, pt. 1: 94. *pl. 31*. 1861.

Small tree or shrub, about 18 feet in height, with many branches. Trunk branching a few feet above the ground. Bark greenish or pink and coarsely fissured; inner bark reddish brown. Fruit ovoid, green, and borne in clusters; December–January.—Not common; forming undergrowth in dense forest (alt. 1,700 ft.).

Sapwood uniform pale yellow or pinkish white, streaked; heartwood pinkish, dark reddish, or purplish brown, and sharply demarcated. Wood odorless and tasteless; straight- or roey-grained; fine-textured; not very easy to work, but capable of taking a smooth polish; checks in drying; durable and strong. Growth rings present. Parenchyma abundantly developed; surrounding the pores and occasionally in concentric bands, which appear to indicate limit of growth rings; producing a slightly hoary effect on cross section. Pores small; numerous, tending to ring-porous; mostly in small radial multiples or solitary, seldom in small radial rows; usually open. Vessel lines fine, of same color as background, and indistinct. Rays numerous, very fine, and evenly spaced on cross section; indistinct on tangential; lighter-colored than adjacent elements and faintly discernible with lens on radial surface.

San Martín: Juan Guerra, middle Huallaga, *6887*.—Loreto: near Iquitos, *8011*(?).

ELAEOCARPACEAE. Elaeocarpus Family

This family, included by some botanists in the Tiliaceae, consists of trees or shrubs. Leaves simple, alternate or opposite, and with persistent or deciduous stipules. Flowers in axillary racemes or in cymes and usually with numerous stamens. Fruit a capsule or berry, often bur-like. Although used locally to a limited extent, the timbers are not commercially important.

Wood white or pale yellowish to pinkish brown; heartwood sometimes well defined, dark brown. Wood odorless and tasteless; medium- to coarse-textured; light and soft to fairly heavy; requires a sharp knife to cut smoothly across grain, at times firm and capable of taking a smooth finish; some species fairly durable. Parenchyma indistinct or visible as numerous, very fine lines extending between the rays. Pores of medium size to large; numerous or fairly numerous and well distributed; predominantly solitary, seldom in multiples in *Sloanea;* open or sometimes filled with calcium deposit. Rays moderately distinct on cross and tangential sections; distinct on radial.

Vessel perforations mostly simple to scalariform. Rays homogeneous to heterogeneous; most commonly 4–6 cells wide.

1. MUNTINGIA L.

Muntingia Calabura L. Sp. Pl. 509. 1753. *Bolina, Iumanasa, Mullaca-huayo.*

Slender tree, at times attaining a height of 45 feet. Crown almost flat or occasionally conical; branches elongated. Trunk straight, columnar, about 10 inches in diameter, and clear of limbs up to 10 feet. Bark dark purplish brown or almost black with low interwoven ridges, fibrous; is used for cordage. Leaves almost sessile, unequal at the base, toothed, whitish beneath. Flowers axillary, solitary, and on long stalks; petals white or pinkish; stamens numerous. Fruit a globose berry, yellow or red at maturity, edible, and contains many seeds.—Widely distributed throughout the lowland; in second growth or along edge of forest, frequently in the vicinity of streams (alt. 400–500 ft.); reported also from La Merced (alt. 2,000 ft.), and from the Colonia Perene. Wood is used sometimes as a substitute for balsa wood in making rafts, but is utilized mostly for fuel.

Wood pale yellow to pinkish brown throughout; has no distinctive odor or taste; straight- or interwoven-grained; rather coarse-textured; light and moderately soft, but strong; easy to work, takes a smooth finish, and holds its place well; not durable. Growth rings absent or visible owing to variation in depth of color and occasionally due to alinement of elements. Parenchyma indistinct or visible as numerous, very fine lines extending between the rays. Pores not numerous and well scattered; solitary, infrequently in small radial or tangential multiples; open. Vessel lines slightly darker than background and discernible without lens, but not

prominent. Rays fairly broad; barely distinguishable to unaided eye on cross and tangential sections; prominent and producing a silver grain on radial surface. Ripple marks present, but indistinct; not all elements storied; number per inch length, up to 140.

Loreto: lower Nanay, *457;* La Victoria, *2885;* lower Huallaga, *4931;* near Iquitos, *8025.*

2. SLOANEA L.

Small or large trees. Leaves fairly large or very large, stalked. Flowers small, whitish, in few-flowered, axillary or lateral racemes, and with numerous stamens. Fruit a hard or woody capsule, usually covered with bristles.

Wood usually white when fresh, of various shades of brown, ranging from yellowish, grayish, reddish to purplish when dried; odorless and tasteless; medium-textured; light in weight to heavy; easy to work; sometimes durable. Parenchyma sparingly developed and indistinct. Pores of medium size to large; numerous or fairly numerous and well distributed; predominantly solitary, also in multiples; infrequently filled with calcium. Rays fairly distinct on cross section; sometimes visible without lens on tangential; conspicuous on radial surface.

Vessels with simple perforations. Rays heterogeneous; 6 or more cells wide and few to many cells high.

The following have been determined generically:
Loreto: La Victoria, *2950, 3162.*

TILIACEAE. Linden Family

Trees, shrubs, or herbs, the pubescence most often of branched hairs. Leaves alternate, simple, stalked, sometimes lobed, with stipules. Flowers small or large and showy, with 5 free or coherent sepals, normally 5 petals, and usually numerous stamens. Fruit a capsule or berry, or often bur-like. The best-known member of this family in the northern temperate zone is basswood or linden (*Tilia*), furnishing a soft, white lumber of great utility. In the East Indies, herbaceous species of *Corchorus* are cultivated extensively as the source of jute or gunny, a coarse, strong textile fiber which is an important article of commerce.

The woods are white, yellowish, to light brown, usually with a grayish cast; odorless and tasteless; moderately fine- to rather coarse-textured; light and soft to moderately heavy; fibrous and require a sharp knife to cut smoothly across grain; perishable to

fairly durable. Parenchyma developed in varying abundance, with a tendency toward irregular tangential lines, rarely visible without lens, sometimes in a fine meshwork. Rays sometimes of two sizes, the larger fairly distinct on cross section; invisible without lens on tangential; moderately distinct on radial surface. Ripple marks present in *Apeiba, Luehea,* and *Mollia,* and of two kinds: (1) where all elements are distinctly storied as in *Luehea;* and (2) where the larger rays are not storied or occupy two to several tiers as in *Apeiba* and *Mollia;* in the last the markings are indistinct and irregular. In *Apeiba* and *Heliocarpus* unlignified, cottony tissue is arranged either irregularly or concentrically.

Vessel perforations mostly simple; vessel-ray pits simple or half-bordered. Rays decidedly heterogeneous; 1–4, sometimes 6, cells wide and up to 40 cells or more high. Wood fibers fairly thin-walled; pits numerous, small, simple or half-bordered.

1. APEIBA Aubl.

Trees or shrubs, confined mainly to the northern half of South America. Fruit resembles a sea-urchin. Wood white or pale grayish brown; fairly coarse-textured; soft or almost spongy; of a peculiar laminated structure consisting of unlignified, cottony tissue alternating with fairly compact wood; suitable for rafts and other purposes requiring material of light weight; requires a sharp knife to cut smoothly across grain; perishable. Parenchyma indistinct without lens. Pores of medium size or large; fairly numerous and tending to be confined to the compact tissue; solitary, in multiples, or in clusters; open. Rays of two general sizes, the larger fairly distinct on cross section; faintly discernible on moistened tangential; moderately distinct in proper light on radial surface. Ripple marks present in the lignified tissue only and moderately distinct, but irregular because some of the larger rays occupy more than one tier; number per inch length, 60–72.

Apeiba aspera Aubl. Pl. Guian. 1: 545. *pl. 216.* 1775. *Maqui-sapa, Maqui-sapa-ñaccha.*

Medium-sized to tall, deciduous tree, sometimes attaining a height of 80 feet. Crown spreading. Trunk straight, cylindrical, up to 14 or 18 inches in diameter, and free of branches for from 10 to 55 feet. Bark yellowish or grayish to light or dark brown, with incrustations and shallow interwebbing ridges; inner bark fibrous; sometimes used for ropes. Leaves elliptic-oval, short-acuminate

at apex, acute or rounded at base, glabrate, petiolate. Fruit black when ripe, depressed-globose, 2 inches in diameter, coriaceous, pulpy within, and provided with numerous stout spines resembling a sea-urchin.—Fairly abundant; in dry medium loam near edge of tall growth or in dense forest, preferably in areas free of inundations (alt. 400–500 ft.). Wood has no application except for firewood.

Wood uniform pale yellow or grayish brown and with no clear demarcation between sap and heart; odorless and tasteless; straight-grained; medium- or coarse-textured; light in weight, but firm and somewhat strong; cuts easily and takes a smooth, lustrous finish; not durable. Growth rings sometimes present owing to variation in porosity. Parenchyma in extremely fine, rather numerous, tangential lines extending between the rays, and distinguishable with lens only when surface is moistened. Pores large and visible without lens; scattered; solitary or in radial, rarely tangential, multiples of 2–3; open. Unlignified cottony tissue abundant. Vessel lines appear as deep, dark scratches. Rays apparently of two sizes, the larger moderately fine to broad and readily visible to unaided eye on cross section; lighter-colored than background and visible on tangential and radial surfaces. Ripple marks present, mostly in lignified tissue; number per inch length, up to 72.

Loreto: Paraíso, upper Itaya, *3315;* Yurimaguas, *4012.*

Apeiba Tibourbou Aubl. Pl. Guian. 1: 538. *pl. 213.* 1775. *Maqui-sapa, Maqui-sapa-ñaccha.*

Medium-sized tree, from 55 to 70 feet tall. Crown flat, spreading, or round. Trunk often inclined, cylindrical, from 10 to 15 inches in diameter, free of branches up to more than half the height, and with small buttresses up to 2 or 3 feet high. Bark moderately thick, pale brown or purplish to bluish black, with interwebbing ridges and a fibrous inner bark. Bark and leaves secrete a sap and medicinal properties are ascribed to the flowers. Leaf blades elliptic-ovate or elliptic-oval, acute or short-acuminate at apex, cordate at base, crenulate, stellate, hirtellous. Flowers white or yellowish brown, in lateral cymes. Fruit pendent, depressed-globose, grayish black when ripe, about 3 inches in diameter, densely covered with long, stout, hairy spines.—Of rather limited distribution; in the lower Huallaga region and around the estuary of the Mayo, middle Huallaga (alt. 500–1,600 ft.); reported also from La Merced (alt. 2,000 ft.). Timber is not used locally for any particular purpose except for fuel.

Wood uniform pale pinkish brown; light in weight, soft, and suitable for rafts. Unlignified tissue more abundant than in *A. aspera*. Pores of medium size to large; solitary or in radial multiples of 2–3; open. Ripple marks present; not so distinct as in *A. aspera;* number per inch length, about 60.

Loreto: Puerto Arturo, lower Huallaga, *5004*.—San Martín: Morales, near Tarapoto, *5694;* Juan Guerra, *6727*.

2. HELIOCARPUS L.

Heliocarpus popayanensis HBK. Nov. Gen. & Sp. 5: 341. 1823. *Llausa-quiro.*

Fast-growing tree, 50 feet tall. Crown open. Trunk moderately straight, round, and branching 3 or 4 feet from the base. Bark light to dark chocolate brown and fairly smooth; inner bark very fibrous and is used for cordage. Flowers small, white, in large, open panicles; October–November. Fruit elliptic, with slender, soft spines.—Uncommon; in sandy or dry medium loam in old clearings (alt. 500 ft.).

Wood creamy white with a moderately high silky luster and turning to creamy yellow on exposure; odorless and tasteless; straight-grained; medium- or rather coarse-textured; very light and soft, but strong for its weight; requires a sharp knife to cut smoothly across grain, saws slightly woolly, easy to work, but does not take a smooth finish, and holds its place well; perishable. Growth rings absent. Parenchyma in narrow bands surrounding the pores. Pores appear as fine pinpoints; comparatively few and well distributed; solitary, less frequently in radial multiples or rows of 2–4; open. Vessel lines short and slightly darker than the surrounding elements; walls often lined with light or dark gum. Rays moderately fine or rather coarse, lighter-colored than adjacent fibers, and at limit of vision on cross section; discernible also without lens in proper light on radial surface. Pith grayish white.

Intervascular pits fairly large with sieve-like apertures; vessel-ray pits simple to half-bordered. Rays heterogeneous; 1–4, sometimes 6, cells wide and 40 cells or more high.

Loreto: Yurimaguas, *4297*.

3. LUEHEA Willd.

Shrubs or trees. Leaves dentate, 3- or 5-nerved. Flowers large and showy, white, in axillary cymes; the calyx subtended by numerous bractlets. Capsule large and woody, 5-celled, usually 5-angulate, and many-seeded.

Wood yellow, pale pink, or grayish brown; fairly fine- or medium-textured; of medium weight to rather heavy; rather fibrous; fairly durable or decidedly durable. Parenchyma in very fine tangential lines extending between the rays, occasionally terminal; narrower than rays and not visible without lens. Pores of medium size to rather large; moderately numerous and fairly well distributed; predominantly in radial multiples, also in small radial rows, solitary, or in small clusters; open. Rays fairly distinct on cross section; indistinct on tangential; moderately distinct on moistened radial surface. Ripple marks present and distinct; all elements storied, though some of the rays occupy more than one tier; number per inch length, from 60–80.

Luehea tarapotina Macbr. Candollea 5: 382. 1934. *Calzoncillo, Calzoncillo-panga.*

Tree, from 27 to 45 feet in height. Crown spreading or conical. Trunk straight, round, 9 inches in diameter, and clear of branches for from 7 to 12 feet. Bark 0.5 inch thick, light to dark gray; inner bark purplish brown. Fruit ovoid, golden brown; January.—In sandy loam among shrubs and small trees (alt. 1,400 ft.). Wood used for fuel.

Wood pale brown or yellowish throughout; odorless and tasteless; straight- or roey-grained; moderately fine-textured; of medium weight and strong; fairly easy to work and takes a smooth finish; durable. Growth rings visible. Parenchyma in numerous, fine, irregularly spaced lines extending between the rays. Pores small; fairly numerous and evenly scattered; mostly in radial multiples of 2–5, also solitary; open. Vessel lines fine; sometimes filled with brown or grayish deposits. The larger rays readily distinguishable, but not conspicuous to unaided eye, on cross section; faintly visible on moistened radial surface; cells often filled with small globules of brown gum. Ripple marks present; all elements storied; number per inch length, about 80.

San Martín: Tarapoto, *5699, 5704.*

Luehea Tessmannii Burret, Notizbl. Bot. Gart. Berlin 9: 836. 1926.

Tree, approximately 35 feet tall. Crown spreading. Trunk moderately straight, 12 inches in diameter, and free of limbs for 20 feet. Bark yellowish or dark purplish brown, rough. Fruit 5-celled, black when mature; May–June.—Not common; in humid loam among shrubs and small trees or along banks of streams (alt. 380 ft.). Wood used only to a limited extent for fuel.

Wood pinkish or pale grayish brown throughout; of lighter density and not so compact as *L. tarapotina;* easy to work and takes a smooth finish. Rays not so distinct on cross section, and storied arrangement of the elements more pronounced than in the other species.

Loreto: Caballo-cocha, *2419.*

4. MOLLIA Mart.

Mollia sp. *Uchu-huayo.* Tree, approximately 20 feet in height. Crown spreading. Trunk fairly straight, 10 inches in diameter, and unbranched for 14 feet. Bark dark brown, fairly smooth or with numerous, low ridges; inner bark reddish brown and fibrous. Fruit bipartite; May–June.—Not common; in slightly humid loam or in the vicinity of streams in dense forest (alt. 450 ft.).

Wood pale pink or pinkish brown; odorless and tasteless; straight-grained; medium- or rather coarse-textured; light in weight, but firm and strong; easy to work and takes a fairly smooth finish; fairly durable. Growth rings present. Parenchyma paratracheal and in indistinct, short, irregular, tangential lines or bands uniting the pores. Pores of medium size and barely at limit of vision; not numerous, well distributed; in radial, tangential, or diagonal multiples of 2–3, less frequently solitary or in small clusters; open. Vessel lines short, of darker color than background, and prominent. Rays fine and barely visible without lens on moistened cross section; indistinct on tangential; low and barely distinguishable with lens on radial surface.

Rays heterogeneous; uniseriate or partly biseriate. Wood fibers fairly thin-walled.

Loreto: upper Nanay, *963.*

MALVACEAE. Mallow Family

The members of this family are mostly herbs, but often woody shrubs, and sometimes attain the size of small trees. Leaves alternate, simple, often lobed, and provided with stipules. Flowers sometimes showy, with 5 more or less united sepals, 5 colored petals, and numerous stamens united to form a column. Fruit dry, capsular, or fleshy. Many of the Malvaceae exude a mucilaginous sap and have a tough fibrous bark used locally for cordage; others are valuable for decorative planting.

Sapwood light-colored, ranging from white or oatmeal to pale brown and frequently with a grayish cast; heartwood pinkish to

dark brown. Woods odorless and tasteless; light, soft, and perishable as in *Hibiscus* or *Pavonia*, to moderately heavy, firm, and durable as in *Tetrasida;* fairly or highly lustrous; some saw woolly and require a sharp knife to cut smoothly across grain, others are easy to work and take a good polish. Parenchyma paratracheal and often indistinct with lens, also in numerous, fine, broken, sometimes irregularly arranged, tangential lines extending between the rays, occasionally confluent. Pores small or medium-sized; few to numerous, diffuse or rarely showing tendency to ring-porous (in *Sida*); solitary or in multiples or rows; open or closed. Rays moderately fine to rather broad on cross section; invisible to unaided eye on tangential; moderately distinct on radial surface; numerous specks of dark gum present in cells, especially on tangential surface, in *Sida*. Ripple marks present in *Hibiscus* and *Tetrasida*. Intercellular canals, vertical-gummosis type, are present in *Hibiscus*.

Vessel perforations simple; vessel-ray pits small or moderately large, simple to half-bordered. Rays heterogeneous and showing a tendency in *Sida* and *Tetrasida* to homogeneous; from 1–4 cells wide and up to 30 cells or more high. Wood fibers thin- or thick-walled; pits usually small and inconspicuous. Crystals of calcium oxalate often present in ray cells in *Sida* and *Tetrasida*.

1. HIBISCUS L.

Herbs or shrubs, sometimes small trees, widely distributed in temperate and tropical countries, and cultivated for ornament. Leaves entire or lobed. Flowers 5-parted, axillary or in cymes; corolla usually campanulate and showy. Fruit a dry, more or less dehiscent capsule.

Wood white, yellowish white, or sometimes pinkish brown; fine- or medium-textured; light in weight, but firm. Parenchyma paratracheal and in indistinct tangential bands or lines. Pores of small or medium size; solitary or in radial multiples of 2–6; mostly open. Vessel lines sometimes visible without lens. Rays broad or fairly broad and discernible without lens on cross section; invisible or visible on radial surface. Ripple marks present; not all elements storied. Intercellular canals, gummosis type, often present.

Hibiscus tiliaceus L. Sp. Pl. 694. 1753.

Shrub or small tree, up to 20, infrequently 35 or 40, feet tall. Crown round. Trunk erect, cylindrical, slender, and clear of limbs for from 8 to 15 feet. Bark pinkish or grayish brown; inner bark fibrous and is used for cordage. Leaves rounded, abruptly pointed,

nearly entire, green above, covered beneath with a whitish felt. Flowers yellow, large, and showy; July–August.—Common in swampy thickets or in old clearings (alt. 450 ft.). Wood not used locally except for fuel.

Sapwood almost white, pale yellowish, or pinkish brown; heartwood dark brown or almost black. Wood light in weight, but firm; straight-grained; medium-textured; easy to work and rather lustrous; not durable. Parenchyma paratracheal and in indistinct, tangential bands. Pores of medium size; solitary or in small radial multiples of 2, sometimes up to 4, also in tangential pairs; mostly open. Vessel lines at limit of vision; often filled with dark brown gum. Rays barely discernible without lens on cross section; indistinct on other surfaces. Ripple marks present; not all elements storied; number per inch length, about 90.

Loreto: upper Itaya, *1302*.

2. MALACHRA L.

Malachra alceifolia Jacq. Coll. 2: 350. 1788; Ic. Pl. Rar. 3. *pl. 549*. 1786–93. *Malva*.

Shrub, from 3 to 12 feet tall. Bark dark brown, with numerous, anastomosing ridges; inner bark fibrous and sometimes used for cordage.—Fairly common in the lowland; in open dry medium loam, often cultivated for its attractive yellow flowers.

Wood white or grayish white and has a silvery luster; fine- or medium-textured; light in weight, soft.

Loreto: lower Nanay, *447;* herbarium material collected also in the lower Itaya and Huallaga.

3. PAVONIA Cav.

Pavonia leucantha Garcke, in Eichl. Jahrb. Berl. 1: 211. 1881. *Mushu-sillo, Yerba del monte*.

Common shrub, from 5 to 8 feet tall. Bark pinkish brown, with a network of small ridges; inner bark fibrous.—Especially abundant in the lowland, forming undergrowth in dense forest (alt. 400 ft.), also on the plain of Tarapoto and in the vicinity of San Roque (alt. 1,400–3,000 ft.).

Sapwood pale yellow, turning on exposure to pale gray; heartwood brown, thin. Wood straight-grained; uniformly fine-textured; light and soft. Growth rings indistinct or absent. Parenchyma paratracheal; sparingly developed and invisible even with lens.

Pores minute or small; not numerous, uniformly scattered; solitary or in small radial rows or multiples. Vessel lines fine, of same color as background, and indistinct. Rays fine or fairly fine, closely spaced, and distinguishable with lens on cross section; not visible on other surfaces.

Loreto: lower Itaya, *241*.

4. TETRASIDA Ulbr.

Tetrasida polyantha Ulbr. Bot. Jahrb. 54: Beibl. 117: 66. 1916.

Uncommon tree, about 42 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched up to 15 feet. Bark light gray or greenish brown, with numerous shallow fissures. Fruit globose, brown when mature; December–January.—Among small trees and shrubs of secondary growth (alt. 1,400 ft.); collected also by Weberbauer between Jaén and Bellavista near the Río Marañón, Department of Cajamarca (alt. 1,900 ft.).

Wood oatmeal-colored or creamy yellow throughout; has no distinctive odor or taste; straight- or interwoven-grained; fairly fine- or medium-textured; rather heavy, hard, and compact; not difficult to work, takes a smooth polish, and holds its place well when finished; durable. Growth rings present owing to variation in abundance of parenchyma. Parenchyma paratracheal, also in unevenly and irregularly spaced, broken or continuous, concentric bands, often uniting the pores; distinct. Pores small or fairly small; numerous, uniformly distributed; in radial rows or multiples of 2–5, less frequently solitary or in tangential pairs, seldom in small clusters; open. Vessel lines fine, of same color as background, and invisible to unaided eye. Rays fine or fairly fine, slightly wavy, fairly numerous, and discernible only with lens on cross section; indistinct on other surfaces or sometimes visible on radial in proper light. Ripple marks distinct; all elements storied; number per inch length, about 112.

Rays heterogeneous; 2–4 cells wide. Wood fibers thick-walled. Irregularly shaped crystals of calcium oxalate common in ray cells.

San Martín: near Tarapoto, *6663*.

BOMBACACEAE. Silk-cotton Tree Family

Large or small, soft-wooded trees, noted for their fast growth and some for their massive, sometimes peculiarly swollen, trunks. Leaves alternate, simple or palmately compound. Flowers often large and showy; petals 5; stamens 5 to many, either free or united

to form a tube. Fruit dry or fleshy, 2–5-celled, dehiscent or indehiscent, with 2 to many seeds in each cell; in *Bombax* and *Ochroma* the seeds are imbedded in a silky fiber, employed for stuffing pillows, cushions, mattresses, and for textiles. The fibrous inner bark is used locally for cordage.

Woods vary from white or yellowish to gray or brownish; spongy or very light, as in *Bombax* and *Ochroma*, to moderately heavy and firm, as in *Quararibea*. Parenchyma usually in the form of very fine, sinuous, tangential lines, suggesting those of the Anonaceae, except that they are more numerous and less distinct. Rays often high and conspicuous on radial surface. Ripple marks are present in some of the woods and provide a valuable diagnostic feature. Vertical canals, gummosis type, are present in *Bombax*. Dark brown gum is common in pores of *Matisia*, *Ochroma*, and *Quararibea*.

Vessels with simple perforations; vessel-ray pits large, simple. Rays heterogeneous; mostly 2–9 cells wide, and very high.

1. BOMBAX L.

Small or large, unarmed trees. Leaves palmately compound; leaflets usually 5, entire. Flowers mostly solitary and appear when the tree is bare of leaves. Fruit a 5-celled woody capsule; seeds numerous, small, pea-like, imbedded in a brown silky fiber. The trees grow with great rapidity, attaining a large size in a few years, and are most common in overflow lands of the main rivers, in old clearings, or along margins of forest growth. The light, soft timber is employed for rafts and for cheap box and crating material; the silk "cotton" filling the fruit is collected for use in stuffing pillows, mattresses, and upholstery; and the bark furnishes a fiber used for cordage.

Wood whitish or yellow to a dull brown, often with a grayish or pinkish cast, not sharply demarcated into sap and heart; has no distinctive odor or taste; straight- or fairly straight-grained; coarse-textured and harsh; light, soft, and spongy to fairly firm; saws woolly, fairly easy to work, does not take a smooth finish, and holds nails well; not durable. Parenchyma in numerous, fine, closely spaced, tangential or concentric lines interrupted by the rays. Pores small to large and distinct; few or fairly numerous; solitary, in small radial rows, or infrequently in small clusters. Vessel lines distinct. Rays variable in size, the larger visible on cross section; invisible or visible on tangential; often conspicuous on radial; homogeneous or inclined to heterogeneous; mostly 2–3 cells wide. Ripple marks

present and of two kinds: (1) visible to unaided eye, not very regular; and (2) distinguishable only with lens, several times more numerous than the others. Vertical canals, gummosis type, often large and conspicuous.

Bombax aquaticum (Aubl.) K. Schum. in Engl. & Prantl, Pflanzenfam. 3, pt. 6: 62. *fig. 30B*. 1890. *Bellaco-caspi, Huimba.*

Small or medium-sized tree. Crown spreading. Trunk erect, cylindrical, at times up to 10 inches in diameter, and clear of limbs for three-fourths the height. Bark light to dark brown, thick, with fibrous inner bark, and yields a small quantity of colorless resin.

Wood pale yellowish or pinkish brown, darkening slightly on exposure to air, and often with fine, black veining; fairly light in weight. Growth rings indistinct or faintly discernible owing to alinement of pores. Pores large; fairly numerous and uniformly distributed; solitary, in radial multiples of 2–4 or more, infrequently in small clusters. Vessel lines prominent, slightly darker than adjacent elements; lustrous tyloses and white or dark deposits common. Rays faintly visible on cross section; readily distinguishable on tangential; visible, but not conspicuous, on radial.

Loreto: Caballo-cocha, *2431;* lower Huallaga, *3937.*

Bombax Munguba Mart. & Zucc. in Mart. Nov. Gen. & Sp. 1: 93. 1824. *Huina-caspi, Punga, Punga blanca.*

Fast-growing tree, up to 120 or 150 feet in height. Crown conical in young trees, wide-spreading in old trees. Trunk straight or moderately so, round, up to 28 inches in diameter, and undivided for half the entire height. Bark lustrous yellowish brown, turning to reddish brown in old trees; inner bark coarsely fibrous and is used for cordage. Flowers white, large, and conspicuous; May–June.—Common throughout the lowland (alt. 350–450 ft.); in open sandy areas or in slightly humid loam along margin of forest. Wood is used to some extent for rafts.

Wood varying in color from creamy white to pale or dark pinkish brown and subject to a bluish gray stain; requires a sharp knife to cut smoothly across grain, easy to work, and does not take a smooth finish. Growth rings present. Pores numerous; solitary or in radial multiples of 2–3. Vessels often filled with black gum. Rays lighter-colored than background and faintly visible on cross section; indistinct or barely distinguishable on other surfaces.

Loreto: lower Itaya, *260;* upper Nanay, *610;* Caballo-cocha, *2506;* La Victoria, *2866.*

Bombax paraense Ducke(?), Archiv. Jard. Bot. Rio Janeiro 4: 124. 1925. *Punga blanca de chamizal.*

Small tree, 25 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched for 15 feet. Bark reddish brown, with long, irregular ridges; inner bark fibrous. Flowers white, large; April–May. Fruit light brown.—Common in some localities; in slightly humid loam in dense forest, at times forming almost pure stands (alt. 450 ft.).

Wood pale brown when fresh, reddish brown when dried; medium-textured; fairly heavy; appears to be more durable than the other species. Growth rings present. Pores at limit of vision; few and well scattered; solitary, less frequently in small radial multiples; open. Vessel lines indistinct or darker than adjacent elements; lustrous tyloses, reddish brown gum, and calcium deposit common. Rays wavy on cross section; faintly visible without lens on cross and radial sections; specks of reddish brown gum common in cells on tangential and radial surfaces.

Loreto: Manfinfa, upper Nanay, *1097.*

2. MATISIA Humb. & Bonpl.

Small or sometimes large trees, represented by about 10 species mostly in the Guianas, Colombia, and Amazon Valley. Leaves entire or subentire. Flowers often violet-colored; calyx campanulate, 5-lobed, petals obovate-oblong or spatulate. Fruit drupaceous, with a fleshy mesocarp.

The wood of the Peruvian species is oatmeal-colored or pale yellowish with grayish or dark brown streaks; straight-grained; medium- to coarse-textured; of light or medium weight; easy to work and capable of taking a smooth polish; not durable. Parenchyma paratracheal and metatracheal. Pores minute, small, or visible without lens. The larger rays conspicuous on cross section; faintly visible on tangential; indistinct or distinct on radial; heterogeneous; 9 cells or more wide and very high.

Matisia cordata Humb. & Bonpl. Pl. Aequin. 1: 10. *pl. 2.* 1805. *Zapote.*

Forest tree of the lowland, attaining a height of from 45 to 100 feet. Crown round or flat. Trunk erect, cylindrical, up to 26 inches or more in diameter above the large buttresses, and clear of branches for from one-third to three-fourths the entire height. Bark dark gray or reddish brown, about 1 inch thick; inner bark

fibrous. Leaves in dense clusters borne at tip of branchlets, glabrous. Flowers with green calyx, pale yellow or pink petals, and yellow staminal filaments.—Widely scattered, but not very abundant, in Loreto; usually in flood-free areas (alt. 380–500 ft.). Wood not used locally.

Wood oatmeal-colored or light brown with darker brown streaks and a grayish cast; odorless and tasteless; straight-grained; medium- to coarse-textured; light in weight, soft, and brittle; easy to work and capable of taking a smooth finish; likely to check in drying and subject to stain; perishable. Growth rings absent. Parenchyma in numerous, short, closely spaced lines extending between the rays. Pores visible without lens; few to fairly numerous and well scattered; solitary or in radial multiples of 2–5, infrequently in small clusters; open. Vessel lines faintly discernible or distinct on account of black gum or white deposit frequently present. The larger rays broad and prominent on cross section; occasionally visible without lens on tangential; lighter-colored than background and indistinct on radial surface. Pith grayish white.

Loreto: lower Itaya, *170;* Caballo-cocha, *2182;* San Antonio, upper Itaya, *3515.*

Matisia ochrocalyx Schum. in Mart. Fl. Bras. 12, pt. 3: 238. 1886. *Zapotillo.*

Tree, up to 25 feet or more in height. Crown conical or almost flat. Trunk round and straight or moderately so, slender, and clear of branches up to half the entire height. Bark pale gray or dark pinkish brown, fairly smooth or with long, coarse, shallow fissures. Calyx deep yellow and green proximally; petals white; staminal tube yellowish white. Fruit brown when mature and edible; October.—Common in the lowland; in sandy loam in thickets and old clearings (alt. 380–600 ft.). Wood not employed locally.

Wood pale yellow with grayish streaks; heavier and more compact than *M. cordata;* takes a smooth finish with a characteristic figure on account of the prominent rays; susceptible to insects and subject to stain. Growth rings present. Parenchyma surrounding the pores and in very fine, wavy, more or less regular, closely spaced lines extending between the rays. Pores minute or small; few and well scattered; mostly solitary; open or closed. Rays white and conspicuous on cross section; faintly visible on tangential; slightly darker-colored than adjacent elements and rather distinct on radial surface.

Loreto: lower Nanay, *648;* Pebas, *1576;* upper Itaya, *3389.*

3. OCHROMA Swartz

Small or medium-sized trees of rapid growth, common and conspicuous in thickets or old clearings. Leaves simple, very large, long-stalked, usually shallowly lobed, stellate-pubescent. Flowers whitish, large. Capsule long and narrow; the numerous, small seeds imbedded in brown cotton-like fiber, the last often employed like kapok. The very light and soft but comparatively strong wood is the same as the well-known balsa wood of commerce. Its most important use locally is for rafts. Balsa is usually a second-growth tree, though it does occur occasionally as an isolated tree in high forest, and appears promptly where clearings have been made by such agencies as human cultivation, floods, and fires.

Wood lustrous white, becoming dull pale brown on exposure to air, sap and heart usually not clearly demarcated; odorless and tasteless; lighter than cork, soft, and spongy; straight-grained; coarse-textured; requires a sharp knife to cut smoothly across grain, fairly easy to work, crushes readily, but is strong for its weight; perishable in contact with soil. Growth rings absent or poorly defined. Parenchyma invisible. Pores resemble small pinholes, readily visible; not very numerous and scattered; solitary or in radial multiples of 2 or more; open. Vessel lines appear as long, coarse scratches darker than background; segments readily visible with lens. Rays readily visible on all surfaces. Gum ducts not observed.

In his highly interesting account of the social institutions of the Incas and their predecessors, Philip Ainsworth Means (Trans. Conn. Acad. Arts and Sciences 27: 407–469. Sept., 1925) gives a brief description of the dug-out canoes and the great balsa rafts which were in use at the time of the arrival of the Spaniards in 1530.

"The American Indians as a whole were curiously deficient in skill and enterprise as navigators. The ancient Peruvians were no exception to the general rule. They had, however, several sorts of craft, none of which was worthy of a seaman's admiration. They were as follows:

"1. The dug-out, called *canoa* in the Antilles and *piragua* in what is now called Colombia. The dug-outs of the people on the coast of Peru were commonly made of the light wood of the *ceyba* tree. These craft were swift, whether under sails of cotton or propelled by paddles, but they were extremely capsizable. The smallest dug-outs could hold only two passengers; but some of them were 50 or 60 feet long and could hold 30 or more people.

"2. The *totora* raft. Vessels of this type were formed of bundles of a reed called *totora* which grows plentifully in Peru. . . .

"3. Pontoon-rafts of two types: One in which inflated seal-skins were held together, catamaran-fashion, by a wooden platform; the other a platform resting on a number of empty calabashes held together by a network of cords. . . .

"4. The great raft or *balsa*. This, primitive though it was, must be hailed as the *chef d'oeuvre* of the ancient Andean shipwright. It was made of 7, 9, or even 11 thick logs of the very buoyant wood of the balsa-tree, lashed together with cords. The logs were arranged in such a fashion that the middle log was longest; those lying on either side of it were somewhat shorter, and those on the two sides were shortest of all. In this way a sort of bow was formed. Over the raft was a sort of framework of smaller beams upon which a fragile platform with a rude roofed-in area and a mast were erected. The vessel was moved by cotton sails and by paddles. A movable centerboard was inserted when needed between two of the logs."

In conclusion the author states that ". . . balsas capable of accommodating as many as 50 persons were used for long sea voyages and likewise for trading excursions. They seem to have reached their highest development in the coast country around the mouth of the Guayas River, and to this day one may see craft of this kind slowly making their way upstream or down. They serve as a useful supplement to the steam-driven traffic on that stream." The wood of the Peruvian balsa is *Ochroma boliviana* Rowlee.

Ochroma boliviana Rowlee, Journ. Wash. Acad. Sci. 9: 166. 1919. *Balsa, Palo de balsa, Topa.*

Small or medium-sized, deciduous tree, seldom more than 60 feet in height, most frequently from 25 to 40 feet. Crown open or somewhat flat and with branches mostly at the top. Trunk straight, cylindrical or moderately so, up to 13 or 18 inches in diameter, and free of branches for more than a third of the entire height. Bark very thin, reddish or dark purplish brown, fairly smooth or with small scales. Leaves obsoletely 3-lobed, glabrous and dark green above, velvety and tawny white beneath. Very showy when in flower, suggesting tulip tree (*Liriodendron*); flowering in July–August and fruiting in August–October.—Grows best in dry loam (alt. 400–2,000 ft.) and appears promptly where clearings have been made for cultivation. Because of its lightness and ease of handling, combined with its strength, the timber is used for rafts, and to a less extent for house construction.

Wood lustrous white with pale brown striping of vessel lines, becoming dull and darkening slightly to light brown on exposure, sapwood not clearly defined; odor and taste absent or not distinctive; light, soft, and spongy or moderately so; straight-grained; coarse-textured; requires sharp tools to cut smoothly across grain and takes a smooth finish; strong for its weight; but perishable when exposed to weathering. Growth rings present; visible owing to differentiation in depth of color. Parenchyma not visible. Pores resemble small pinholes and are readily discernible without lens. Vessel lines appear as short or long coarse scratches, of darker color than adjacent elements; segments sometimes visible with lens. Rays readily distinguishable and sometimes rather prominent on cross section; discernible but not prominent on tangential; rather high and producing a silver grain on radial surface; heterogeneous. Pith white, up to 0.5 inch in diameter, and with yellowish brown gum specks.

Loreto: lower Itaya, *166;* San Antonio, upper Itaya, *3439;* near Iquitos, *3644.*—San Martín: Tarapoto, *5965.*

4. QUARARIBEA Aubl.

Trees or shrubs. Leaves simple, mostly oblong, entire or nearly so, pinnate-nerved; the dry foliage has the odor of slippery elm (*Ulmus fulva*). Peduncles solitary, 1-flowered, and opposite the leaves. Fruit 2-celled, sometimes by abortion only 1-celled, hard, and not opening; seeds not surrounded by cotton.

Wood creamy white or pale yellow, darkening slightly on exposure, and usually with a pale grayish cast when dried; odorless and tasteless; moderately light but firm to fairly heavy and hard; medium-textured; not difficult to work and takes a smooth finish. Parenchyma in fine, closely spaced, wavy lines; barely visible or at times readily distinguishable without lens. Pores of small or medium size; few or fairly numerous and scattered. Rays distinguishable without lens on cross section and sometimes on tangential.

Quararibea guianensis Aubl. Pl. Guian. 2: 692. *pl. 278.* 1775. *Huayhuash-zapote.*

Small or medium-sized tree, up to 40 feet in height. Crown dense, spreading. Trunk erect, cylindrical, from 6 to 10 inches in diameter, and clear of limbs for half the entire height; branches verticillate, long, flexible, and interwoven. Bark about 0.5 inch thick, pinkish brown with a grayish cast; inner bark yellowish brown and fibrous. Leaves alternate, oblong, nearly glabrous;

dried leaves have a spicy odor. Flowers rather large and attractive, with white petals and stamens, and yellow anthers; October–November. Fruit 1- or 2-celled, with fibrous flesh.

Wood pale yellow, darkening somewhat on exposure, and with extensive pale gray cast; has no distinctive odor or taste; rather heavy, strong, and hard; not difficult to work, inclined to be fibrous; takes a smooth finish; checks in drying; not durable when exposed to weathering and susceptible to stain. Growth rings absent or poorly defined. Parenchyma readily visible with lens. Pores distinguishable without lens; few and well scattered; solitary or infrequently in small clusters; open. Vessel lines discernible without lens, either of the same color as background or filled with white or dark deposits. Rays at limit of vision on cross section; indistinct on other surfaces.

Loreto: Yurimaguas, *4572*.

Quararibea Wittii K. Schum. & Ulbr. Bot. Jahrb. 40: 137. 1907; Verh. Bot. Ver. Brandenb. 50: 90. 1908. *Zapotillo.*

Tree, 90 feet in height. Crown spreading. Trunk erect, cylindrical, 15 inches in diameter, and unbranched for 30 feet. Bark pale yellowish gray or medium brown with numerous small lenticels. Flowers white; October–November. Fruit ovoid, deep yellow when mature, and with a persistent calyx cup.—Uncommon; in dense, flood-free forest (alt. 450 ft.).

Wood pale yellow or almost creamy white and with pale grayish streaks; odorless and tasteless; moderately straight-grained; medium-textured; fairly light in weight, but firm; easy to work, takes a fairly smooth dull polish, and holds its place and color well. Growth rings poorly defined. Parenchyma in very fine, closely spaced, wavy lines; barely visible with lens. Pores of fairly small or medium size; moderately numerous and well scattered. Vessel lines moderately fine and slightly darker than background; light brown specks of gum sometimes present. Rays rather coarse and unevenly spaced on cross section; visible, but not distinct, without lens on tangential; lighter-colored than the surrounding elements and discernible with lens on radial surface.

Loreto: Yurimaguas, lower Huallaga, *4869*.

STERCULIACEAE. Cacao Family

Herbs, shrubs, or trees. Leaves alternate, simple, with stipules; the pubescence often of branched hairs. Flowers small or large, in panicles or cymes; calyx 5-lobed; petals 5, rarely none, some-

times clawed, either free or united with the stamen tube. Fruit dry or fleshy, indehiscent or variously dehiscent. The best and most widely known member of this group is *Theobroma Cacao* L., a small tree growing wild in the Amazon forests and planted there as in other tropical regions for its seeds, the source of cacao.

Woods are cream-colored, pinkish, or variegated light brown and subject to a bluish gray stain; heartwood sometimes well defined, cocoa or dark grayish brown; light and soft or of medium weight; medium- or coarse-textured; often fibrous, easy to work, and take a highly lustrous polish; not durable. Parenchyma developed in varying amounts; paratracheal, at times in very numerous and extremely fine lines, usually invisible without lens, and in some species in coarse lines that are fairly distinct. Pores of medium size or large; few to numerous, diffuse- or rarely ring-porous; mostly solitary or in radial multiples, less often in radial rows or in small clusters; calcium deposit, reddish or dark brown gum, or lustrous tyloses common. Rays broad or fairly broad on cross section; distinct on tangential; fairly high and conspicuous on radial surface. Ripple marks are present in *Guazuma* and *Sterculia*, with only the low rays in seriation or the high ones occupying two to several tiers. Vertical canals, gummosis type, are present in *Sterculia* and *Theobroma*.

Vessels with simple perforations; vessel-ray pits half-bordered. Rays heterogeneous; up to 10 cells wide and few to many cells high.

1. GUAZUMA Adans.

Medium-sized or fairly tall trees. Leaves toothed, short-stalked. Flowers small, in axillary clusters; petals pale yellow. Fruit a woody capsule, covered with hard, sharp-pointed tubercles. Wood is used to a limited extent in carpentry, general construction, and for crating. In *G. ulmifolia* Lam. the inner bark is in thin laminations, fibrous, and is employed for cordage.

Sapwood creamy yellow or pale pinkish brown; heartwood reddish or medium brown; odorless and tasteless; straight-grained; medium- or rather coarse-textured; of light or moderately light weight; saws woolly, but takes a lustrous finish; not durable. Parenchyma in numerous, very fine lines extending tangentially between the rays. Pores of medium size to large; fairly numerous or numerous and well scattered; in small radial multiples, less often solitary or in rows; black gum or lustrous tyloses sometimes present. Rays—many of them rather coarse and distinct on cross section; indistinct or fairly

distinct on tangential; rather high and conspicuous on radial, producing a silver grain. Ripple marks present, but irregular and indistinct; high rays not storied or occupying several tiers; number per inch length, about 80.

Guazuma crinita Mart. Flora 20, 2: Beibl. 95. 1837. *Bolaina.*

Fast-growing tree, from 55 to 110 feet in height. Crown flat or spreading. Trunk straight, round or moderately so, up to 20 inches or more in diameter above the fairly tall buttresses, and either bifurcating near the base or unbranched for two-thirds the entire height. Bark pale grayish or almost black with vertical and horizontal fissures; inner bark medium brown. Flowers pale violet-colored and slightly fragrant; April–June.—Common throughout the lowland (alt. 400–500 ft.); usually in old clearings or along margin of forest clear of inundations. Timber is used for sugar boxes and crates.

Sapwood fairly well demarcated, creamy yellow or pale pinkish brown with irregular dark brown gum striping; heartwood dull medium brown. Wood has no distinctive odor or taste; straight-grained; rather coarse-textured; light or fairly light, but firm and strong; saws slightly woolly, easy to cut, and takes a lustrous finish; not durable. Growth rings indistinct. Parenchyma in numerous, very fine, tangential lines extending between the rays and visible only with lens. Pores at limit of vision; fairly numerous, well scattered; mostly in radial multiples of 2–3, also solitary, seldom in tangential pairs; open or filled with black gum. Vessel lines appear as rather coarse scratches of darker color than adjacent elements. Rays visible without lens on cross and radial sections. Pith medium or reddish brown; translucent deposits common.

Loreto: Río Masán, lower Itaya, *151;* lower Nanay, *434;* Yurimaguas, lower Huallaga, *4221;* Puerto Arturo, lower Huallaga, *5015.*

Guazuma ulmifolia Lam. Encycl. 3: 52. 1789. *Iumanasi, Lluicho-vanilla, Papayillo.*

Tree, from 50 to 90 feet in height. Crown round or spreading. Trunk straight or moderately so, round, up to 30 inches in diameter, and bifurcating from 3 to 11 feet from the base. Bark light to dark chocolate brown and rough; inner bark in thin laminations and fibrous. Leaves oblong to ovate, toothed, cordate and unequal at the base, and densely covered with fine pubescence. Flowers yellow or yellowish brown, in axillary clusters; December–January. Fruit

an ellipsoid or round woody capsule, with short, hard protuberances, dehiscent or indehiscent, black when mature; seeds numerous, large, black, and imbedded in a sweet, edible pulp.—Common in the lower and middle Huallaga regions (alt. 500–1,400 ft.); usually in secondary growth. Timber is used for general construction and the bark furnishes a fiber used for cordage.

Sapwood creamy yellow or pale pinkish brown; heartwood reddish brown. Wood straight-grained; medium- or rather coarse-textured; of light or medium density, strong and rather tough for its weight; easy to work and moderately lustrous; immune to stain and insect attacks, but not durable when exposed to decay. Pores at limit of vision; rather numerous and well distributed; mostly in radial multiples of 2–4, also solitary; open or filled with dark brown gum or white deposit. Rays sometimes rather broad and visible without lens on cross section; indistinct or barely discernible without lens on tangential; fairly prominent on radial surface when held to proper light.

Loreto: Fortaleza, lower Huallaga, *4227;* Santa Rosa, lower Huallaga, *4768.*—San Martín: Tarapoto, *5675;* Río Mayo, *6271.*

2. STERCULIA L.

Sterculia Tessmannii Mildbr. Notizbl. Bot. Gart. Berlin 9: 1149. 1927. *Zapote silvestre.*

Uncommon tree, up to 55 feet in height. Crown spreading. Trunk straight, round, 8 inches or more in diameter, and unbranched for about two-thirds the entire height. Bark light brown and fairly smooth; inner bark fibrous. Flowers yellowish brown.—In moderately dense, flood-free forest (alt. 500 ft.). Timber is not much used, being too soft for ordinary purposes.

Wood in some respects suggests that of the Bombacaceae, light pinkish brown or pale yellow throughout with darker brown veining of vessel lines; odorless and tasteless; straight-grained; coarse-textured; light in weight and rather soft; fibrous, but easy to cut; subject to stain; perishable. Growth rings present or poorly defined. Parenchyma in fine, broken, tangential lines extending between the rays or in continuous concentric bands, sometimes doubled or tripled and producing a meshwork with the rays. Pores prominent on account of the black gum usually present; fairly numerous and well scattered; predominantly solitary, infrequently in radial multiples or rows of 2–3; tyloses also present. Vessel lines conspicuous. Rays rather broad, lighter-colored than background, and

readily discernible without lens on cross section; distinguishable also to unaided eye on tangential; of a dark brown color and distinct or very prominent on radial surface, producing a silver grain; light or dark brown globules of gum abundant in cells and distinguishable with lens, especially on radial section. Ripple marks present but indistinct; only fibers and parenchyma in seriation; number per inch length, up to 150. Vertical ducts, gummosis type, present in the pith.

Loreto: La Victoria, *2570*.

3. THEOBROMA L.

Trees. Leaves large, entire. Flowers small, in axillary or lateral clusters, often borne on the trunk or on the older branches. Fruit large, fleshy, indehiscent; seeds surrounded by pulp. This genus is important commercially as the source of cacao, from which cocoa and chocolate are made. The principal species planted is *T. Cacao* L. The cultivated trees are short-boled and wide-spreading.

Sapwood creamy yellow or variegated pale brown, often with bluish gray cast; heartwood dark grayish brown. Wood odorless and tasteless; sometimes fairly lustrous; fairly fine- to coarse-textured; light and soft to medium weight; tending to be fibrous and easy to work; not durable. Parenchyma paratracheal and in numerous, indistinct, tangential or oblique lines extending between the rays. Pores of medium size to large; few; solitary or in multiples; sometimes filled with gum or calcium deposits. Rays broad on cross section; moderately distinct on tangential; distinct on radial surface. Vertical canals, gummosis type, present.

Theobroma Cacao L. Sp. Pl. 782. 1753. *Cacao, Cacao silvestre.*

Small, evergreen tree, from 18 to 24, sometimes 32, feet in height, with slender, spreading branches and the lateral limbs in clusters. Trunk straight, round, slender, and unbranched for from 5 to 15 feet or more. Bark purplish brown, fairly smooth or with rather coarse ridges; inner bark somewhat fibrous. Leaves short-stalked, oblong, long-pointed, nearly or entirely glabrous. Flowers small, pink, borne in small clusters along the trunk and larger branches. Fruit a large, fleshy, reddish brown capsule filled with firm, juicy pulp in which are imbedded the large brown seeds.—Cacao is grown throughout the lowland, although not on an extensive scale. It is found occasionally in dense forest, but usually in such places it has the appearance of having been introduced by accident or as the result of cultivation in clearings.

Sapwood variable in color from yellowish or pale pink to lavender brown with a grayish cast and dark brown striping; heartwood pale reddish brown. Wood odorless and tasteless; straight-grained; rather coarse-textured; light or moderately light in weight and soft, but firm; requires a sharp knife to cut smoothly across grain, but not difficult to work; subject to stain and perishable. Growth rings absent or present. Parenchyma indistinct. Pores of medium size; few; solitary or in radial multiples of 2. Vessel lines rather fine and often of dark color on account of black gum present. Rays lighter-colored than adjacent fibers and conspicuous on cross section; visible also to unaided eye on tangential; lighter or darker than background and rather conspicuous on radial surface.

Loreto: lower Itaya, *148;* Caballo-cocha, *2105, 2349;* upper Itaya, *3510;* lower Huallaga, *4160.*

Theobroma ferruginea Bernoulli, Denkschr. Schw. Naturf. Ges. 24, no. 3: 13. 1871. *Cacao-senisa, Cumala, Uchpa-cacao.*

Medium-sized or tall tree, ranging in height from 40 to 80 feet. Crown spreading. Trunk straight, round or moderately so, 16 inches or more in diameter, and unbranched up to two-thirds the entire height. Bark reddish or dark brown, with numerous, small scales or few, coarse ridges. Leaves oblanceolate or narrowly ovate. Flowers dark red; May–June. Fruit a schizocarp, dark brown, about 5 inches in length, and pendent.—Not common; in fairly dense forest free from floods (alt. 500 ft.).

Sapwood varying in color from yellowish to pale brown with black veining and grayish areas caused probably by sapstain; heartwood reddish brown, thin. Wood odorless and tasteless; straight-grained; medium- or rather coarse-textured; of light or medium weight; easy to cut and takes a smooth finish; not durable. Growth rings absent or poorly defined. Parenchyma indistinct. Pores of medium size; few and scattered; solitary, in radial multiples of 2–3, seldom in small clusters; often filled with grayish white deposit. Vessel lines readily discernible without lens, but not conspicuous, on account of dark brown or yellowish white deposit. Rays rather coarse, lighter-colored than background, and distinguishable to unaided eye on moistened cross section; darker than adjacent elements and fairly prominent on other surfaces.

Loreto: upper Nanay, *1233;* upper Itaya, *3254.*

Theobroma grandiflora (Willd.) Schum. in Mart. Fl. Bras. 12, pt. 3: 76. *pl. 17.* 1886. *Cupuassú.*

Small tree, about 20 feet in height. Crown spreading. Trunk from 8 to 12 inches in diameter and branching 3 or 4 feet from base. Bark reddish or dark brown with light gray patches and short, rather coarse ridges or excrescences. Pods dark brown, 9 inches in length; the seeds are crushed and employed for preparing a refreshing beverage.—Sometimes planted.

Wood pale pinkish brown, darkening slightly on exposure to air, and with black veining; odorless and tasteless; straight-grained; medium-textured; of medium weight, firm, and fairly tough; easy to work and takes a moderately smooth, dull finish. Growth rings absent or indistinct. Parenchyma invisible with lens. Pores of medium size and barely at limit of vision; more numerous than in *T. ferruginea;* solitary or in radial multiples of 2; open or filled with black gum or yellowish white calcium deposit. Vessel lines visible, but not prominent. Rays rather coarse, wavy, and lighter-colored than background on cross section; distinguishable also to unaided eye on tangential and radial surfaces.

Loreto: Caballo-cocha, *2401*.

Theobroma Mariae (Mart.) Schum. in Mart. Fl. Bras. 12, pt. 3: 71. *pl. 15.* 1886. *Cacahuillo.*

Shrub or small, slender tree, from 10 to 15 feet in height, with few leaves confined to the summit. Trunk straight, slender, and simple. Bark dark brown or almost black, occasionally with light gray patches, fairly smooth or scaly, and with small lenticels; inner bark tan-colored and coarsely fibrous. Leaves up to 17 inches long and 5.5 inches in width, elliptic-ovate, acute or acuminate at apex, glabrous, light green beneath. Flowers borne on trunk; calyx dark purple and corolla creamy white. Fruit cinnamon brown, about 3.5 inches long and 1 inch in width, and with small seeds imbedded in a sweet pulp.—Fairly common in the lowland (alt. 400 ft.); in dense, flood-free forest.

Sapwood pale pink; heartwood pinkish brown. Wood has no distinctive odor or taste; straight- or wavy-grained; coarse-textured; light in weight and soft; requires a sharp knife to cut smoothly across grain; perishable. Growth rings absent or present. Parenchyma indistinct. Pores fairly small or very small; not numerous and well scattered; solitary or in radial multiples of 2–3. Vessel lines fairly long, not prominent, but discernible to unaided eye. Rays coarse, lighter-colored than background, sometimes wavy, and conspicuous on cross section; darker than background and fairly

distinct on tangential; of darker color than adjacent elements and conspicuous on radial surface. Pith light or dark grayish brown.

Loreto: Caballo-cocha, *2332;* La Victoria, *2816, 2843;* upper Itaya, *3345, 3364.*

Theobroma quinquenervia Bernoulli, Denkschr. Schw. Naturf. Ges. 24, no. 3: 8. 1871. *Macambo, Majambo.*

Tree, from 27 to 32 feet in height. Crown spreading or almost flat and branches extending laterally. Trunk straight, round or slightly compressed, slender, and unbranched up to three-fourths the entire height. Bark reddish or dark purplish brown, fairly smooth; inner bark slightly fibrous. Heartwood when cut exudes a small amount of translucent, viscid resin. Leaves up to 16 inches in length and 8 inches in width, glabrous above, tomentose beneath. Flowers small, blue. Fruit about 5 inches long, sessile, and pendent from the under side of branches; seeds surrounded by a sweet, yellowish pulp, which has an agreeable flavor.—Not common; in open, dry loam among low trees and shrubs of secondary growth and sometimes propagated (alt. 380–450 ft.).

Wood varying in color from pale yellow to light brown, with a grayish cast and darker brown or black streaks when dried; odorless and tasteless; straight-grained; coarse-textured; light in weight, but firm and strong; easy to cut and takes a dull finish; perishable. Growth rings absent. Parenchyma indistinct. Pores of medium size to fairly large; not very numerous, uniformly scattered; solitary or in radial multiples of 2–3, sometimes in diagonal or tangential pairs; open or closed. Vessel lines invisible or readily discernible owing to black gum often present. Rays of lighter color than adjacent fibers, fairly broad, and at limit of vision on cross section; distinguishable also without lens on tangential and radial surfaces.

Loreto: Caballo-cocha, *2149;* upper Itaya, *3346.*

Theobroma subincana Mart. Repert. Pharm. 35: 23. 1830. *Cacahuillo.*

Forest tree, from 30 to 40 feet tall. Crown open. Trunk straight, cylindrical, 9 inches in diameter, and unbranched for half the entire height. Bark 0.5 inch thick, yellowish or dark purplish brown, and fairly smooth. Leaves oblong or elliptic-oblanceolate, glabrous. Flowers small, white; April–May.—Uncommon; in fairly dense growth adjacent to streams (alt. 400 ft.).

Wood uniform pinkish or light brown; odorless and tasteless; straight- or wavy-grained; medium- or coarse-textured; of medium weight to rather heavy; not difficult to work and takes a smooth finish; checks in drying; fairly durable. Growth rings absent or present. Parenchyma indistinct. Pores of fairly small or medium size; not numerous and well scattered; solitary or in radial, diagonal, or tangential multiples; open or filled with black or yellowish brown gum. Vessel lines fairly fine, but visible without lens. Rays broad and fairly prominent, lighter-colored than the surrounding elements, and slightly wavy on cross section; visible, but not conspicuous on tangential; darker than background and producing a silver grain on radial surface. Pith pinkish or dark brown, with prominent vertical ducts of the gummosis type.

Loreto: lower Itaya, *161, 230.*

DILLENIACEAE. Dillenia Family

1. CURATELLA L.

Curatella americana L. Syst. Nat. ed. 10: 1079. 1759. *Ractapanga.*

The best-known member of the genus, widely distributed throughout Central and northern South America. Small tree, up to about 35 feet in height. Crown spreading. Trunk straight or bent, 8 inches in diameter, and clear of limbs for only a few feet. Bark thick, exfoliating, and of a dark reddish brown color. Leaves short-petiolate, oval or elliptic-ovate, emarginate, abruptly short-decurrent at base, coriaceous, very rough on both surfaces and contain much silica. Flowers white, in short, dense, lateral panicles, and have a foul odor. Seeds small, dark reddish brown or black, surrounded by a thin aril.—Abundant on the plain of Tarapoto (alt. 1,400 ft.); in dry loam, sometimes forming dense thickets. Wood is used locally for fence posts and fuel, but owing to its poor quality it is not of commercial importance.

Wood brown or reddish brown, variegated on account of the conspicuous rays; sap and heart not clearly defined; odorless and tasteless; interwoven-grained; coarse-textured; rather heavy and hard; difficult to cut and to plane; appears to be durable. Growth rings apparently absent. Parenchyma indistinct or in numerous, exceedingly fine lines. Pores large; few and scattered; solitary; open. Rays broad and wavy on cross section, constituting most of the wood; strands of fibers bend around the rays on tangential; very conspicuous and producing a pronounced silver grain on radial surface.

The wood suggests the Proteaceae, but it differs from this group in that the pores are few and scattered instead of being in tangential alinement and the parenchyma is indistinct or barely visible even with lens. Raphides present in ray cells and visible with lens.

Vessel perforations simple or mostly scalariform. Rays heterogeneous; multiseriate, up to 15 cells wide and extremely high. Wood fibers have distinctly bordered pits.

San Martín: Tarapoto, *5677*.

OCHNACEAE. Ochna Family

Herbs, shrubs, or small to medium-sized, glabrous trees. Leaves simple, with entire or toothed stipules. Flowers small or large and showy, with 5 sepals, 5 petals, and a 3–6-celled ovary. The timbers are not commercially important.

Wood whitish and streaked to pale or deep pinkish brown, usually with a grayish cast; heartwood in *Cespedesia Sprucei* Van Tiegh. well defined, dark brown or almost black; odorless and tasteless; fine- or medium-textured; fairly light to moderately heavy; slightly fibrous in *Cespedesia*, easy to work; moderately durable. Parenchyma paratracheal; sparsely developed and not visible with lens. Pores moderately small to fairly large; few to numerous and well scattered; solitary or in multiples or rows, seldom in clusters; mostly open. The rays on cross section are fine or moderately fine and slightly sinuous (*Cespedesia*) to fine or fairly broad and widely spaced (*Ouratea*); invisible or barely visible on tangential; sometimes moderately distinct on radial surface. Ripple marks absent and gum ducts were not observed.

Vessel perforations are typically simple to scalariform; intervascular pits are small and numerous, their apertures often coalescing into spiral-like striations; vessel-ray pits small, numerous, and half-bordered. Rays heterogeneous; 1–8 cells wide and few to many cells high. The slender fibers have thick walls, very small cavities, minute simple pits, and are often arranged in radial rows. Dark red gum is frequently present in all cells.

1. CESPEDESIA Goudot

Cespedesia Sprucei Van Tiegh. Journ. de Bot. 18: 57. 1904; Ann. Sci. Nat. VIII. 19: 51. 1904.

Tree, from 35 to 50 feet tall. Crown round or flat. Trunk cylindrical, straight, from 8 to 14 inches in diameter, and free of branches for more than half the height. Bark grayish to dark brown, rough;

inner bark coarsely fibrous. Leaves persistent, large, lanceolate or elliptic-oblong, glabrous, leathery, somewhat lustrous, serrulate, blunt at apex, acute at base. Flowers yellow, in axillary racemes. Fruit a dark brown, 1-seeded drupe.—Fairly common around Lamas (alt. 1,600 ft.), in association with shrubs and small trees, also at San Roque in dense forest growth (alt. 3,500 ft.). Wood sometimes used for house construction.

Sapwood uniform pinkish brown with a grayish cast; heartwood pale to dark brown or almost black. Wood has no distinctive odor or taste; straight- or fairly straight-grained; medium-textured; moderately hard and heavy; easy to cut and takes a smooth, lustrous finish; susceptible to insect attacks and not durable. Growth rings absent or indistinct. Parenchyma paratracheal; sparingly developed and indistinct with lens. Pores of medium size to fairly large; numerous, not crowded; mostly in radial, diagonal, or tangential multiples of 2–3, also solitary or in small clusters. Vessel lines moderately fine and short; often filled with pale yellowish white deposit. Rays fine or fairly fine on cross section, slightly sinuous, especially at point of contact with pores; indistinct or barely visible to unaided eye on tangential; slightly darker than background and fairly distinct on radial surface.

Vessel perforations simple; intervascular pits small and numerous; vessel-ray pits small, numerous, and half-bordered. Rays heterogeneous; up to 8 cells wide and few to many cells high. Wood fibers with thick walls and minute lumina, and often arranged in radial rows; pits minute, simple.

San Martín: Lamas, *6460;* San Roque, *7675.*

2. OURATEA Aubl.

Shrubs or small trees. Leaves oblong to elliptic, leathery, shining, finely serrate, short-petioled. Flowers large and showy, with thin, bright yellow petals. Fruit juicy, black, borne upon a fleshy, red disk. Timber is little used locally.

Wood whitish or yellowish to pale reddish or pinkish brown, often with a gray cast; odorless and tasteless; has the consistency of beech (*Fagus*); not difficult to work; liable to check in drying; sometimes durable. Parenchyma indistinct. Pores small to medium-sized; few to numerous; solitary or in radial rows or multiples, seldom in small clusters; occasionally filled with calcium. Rays apparently of two sizes: the larger ones fairly broad and widely spaced on cross section, the smaller numerous, and requiring

the aid of a lens; indistinct on tangential; fairly distinct on radial surface, sometimes producing an attractive figure.

Rays heterogeneous; 3 cells or more wide; gum abundant in all the cells.

Ouratea iquitosensis Macbr. Candollea 5: 382. 1934.

Glabrous, straggly tree, up to 25 feet tall. Crown spreading. Trunk often bent, cylindrical, slender, and clear of branches for about 8 feet. Bark dark chocolate brown, fairly smooth or with small scales. Leaves alternate, leathery, and serrulate. Flowers in lateral or terminal racemes; pedicels jointed at base. Fruit a 1-seeded drupe; May–June.—Common along the banks of the Amazon in the vicinity of Iquitos (alt. 400 ft.), sometimes aquatic. Wood has no local application.

Sapwood thin and indistinctly demarcated, light brown with a pale grayish tinge; heartwood pinkish brown, occasionally with darker brown streaks. Wood odorless and tasteless; interlocked-grained; uniformly fine-textured; rather heavy and brittle; not difficult to work and capable of taking a smooth polish; likely to check in drying; durable. Growth rings present owing to variation in abundance of elements. Parenchyma at limit of vision but indistinct with lens, producing a hoary effect on cross section. Pores minute or small; numerous and showing tendency to ring-porous; mostly solitary. Vessel lines very fine. Rays fairly widely and uniformly spaced on cross section; indistinct on tangential; occasionally discernible to unaided eye on radial surface.

Loreto: near Iquitos, *1491*, *1492*, *1498*, *1499*.

Ouratea pendula (Poepp.) Engl. in Mart. Fl. Bras. 12, pt. 2: 339. 1876.

Shrub, about 13 feet tall, many branched, and with short, slender trunk. Bark grayish or light brown and with numerous small fissures. Flowers yellow. Fruit black when mature; October.—Fairly common in the lower Huallaga (alt. 550 ft.); along margin of forest or in open patches.

Wood variable in color from oatmeal to pale yellow or pinkish with long streaks; straight- or roey-grained; moderately fine- to medium-textured; of light or medium weight; easy to cut and takes a smooth, fairly lustrous finish. Growth rings present. Parenchyma indistinct. Pores of small or medium size, but not visible without lens; fairly numerous; solitary, less frequently in radial, seldom in

tangential, rows or multiples of 2–3 pores, rarely in small clusters; open. Vessel lines fine and of same color as background; often filled with grayish white deposit. Rays very fine, uniformly and closely spaced on cross section; barely discernible to aided eye on moistened tangential; occasionally at limit of vision on moistened radial surface. Pith narrow, pale yellow.

Loreto: lower Huallaga, *4530*.

CARYOCARACEAE. Souari-nut Family

Medium-sized to tall, erect trees, rarely shrubs, of which there are two genera, *Anthodiscus* and *Caryocar*, confined to the tropical regions of northern South America and adjacent Central America, especially in the Guianas and the Amazon Valley. Leaves digitate, trifoliolate, opposite or alternate; stipules 2–4, small and deciduous, or none. Flowers perfect, in terminal, ebracteate racemes; those of *Caryocar* are attractive, pale yellow or red, and of prominent size. In *Caryocar*, their characteristic feature is the numerous, brightly colored stamens with small anthers, the filaments tortuous and closely packed in the bud, and in some species extending well beyond the petals during inflorescence. Fruit a drupe, with an oil-containing mesocarp and a woody muricate endocarp breaking up into 1-seeded parts; seeds thick, round-reniform or thin, compressed. Some of the members of this group yield timbers of commercial importance, others furnish sweet, edible nuts which in some countries form an article of export.

Sapwood in *Caryocar* not always sharply defined, light-colored when fresh, becoming tinged with extensive grayish or bluish gray areas or dark streaks, at times causing it to appear slightly darker than the heartwood, in *Anthodiscus montanus* Gleason uniform and darker brown than in any species of *Caryocar* and turning to chocolate brown on exposure; heartwood in *Caryocar* varies from uniform oatmeal to pale yellow, dull grayish brown, or pale brown, sometimes with a pinkish cast, in *A. montanus*, dark brown or almost black. Woods usually without distinctive odor or taste; straight-, roey-, or much interwoven-grained; fine- or medium- to coarse-textured; moderately heavy and hard to decidedly heavy, hard, and tenacious; easy or moderately easy to work, hold their place and color well; take a smooth polish, and some *Caryocar* species have an oily appearance and a waxy feel; split readily, sometimes brittle; most of them durable. Growth rings absent or present owing to darker areas being free or nearly free of parenchyma, or to certain parenchyma

lines being more regular and distinct than others. Parenchyma paratracheal, also in narrow, broken lines or bands, fairly uniformly and evenly spaced, and diffuse; rhombohedral or polygonal crystals of calcium oxalate rare or common in parenchyma strands. Pores barely visible in *A. montanus*, mostly of medium size to large in *Caryocar;* fairly numerous or numerous, scattered and not crowded; solitary, in radial multiples of 2–5, seldom up to 8; open or filled with froth-like tyloses or dark gum. Vessel lines fine to moderately so or appear as prominent deep scratches. Rays fine to very fine and usually invisible on cross section without lens, lighter-colored than the ground mass, numerous, closely and fairly uniformly spaced; mostly indistinct with lens on tangential; low and inconspicuous on radial surface.

Vessel perforations exclusively simple or rarely scalariform; intervascular pit-pairs minute, or small, fairly numerous to numerous and crowded, usually alternate in *Caryocar* and with narrowly oval or lenticular apertures; vessel-ray pit-pairs either large, often crowded, or else small to moderately small, simple to half-bordered. Rays heterogeneous; very numerous, from 1–4 cells wide and from 2–50, sometimes up to 200, cells high. Wood fibers sometimes in definite radial arrangement, fairly thick- to extremely thick-walled, and lumina minute or almost closed in some *Caryocar* species; septate fibers common in *Caryocar;* pits small, simple or indistinctly bordered. (For further notes on Caryocaraceae see Tropical Woods 42: 1–15. June, 1935.)

1. ANTHODISCUS G. F. W. Meyer

Trees or shrubs. Leaves alternate; leaflets coriaceous, glabrous, penninerved, entire or crenate. Raceme long; calyx small, cupulate, 5-dentate, persistent. Fruit small, coriaceous, smooth, depressed-globose; seeds small, laterally compressed; the radicle long, slender, vermiform.

The only member of this genus collected by the writer is *Anthodiscus glaucescens* Macbr. (Candollea 5: 385. 1934), an uncommon shrub, about 6 feet tall, growing along the margin of forest at San Roque, Department of San Martín, at an elevation of 3,500 feet (No. *7491*, type—herbarium material only).

Of the other four species ascribed to this genus (1) *A. montanus* Gleason is described as a tall tree, from 60 to 100 feet in height, with slender flowering branches and round crown, growing in dense forest, El Umbo region, state of Boyacá, 130 miles north of Bogotá,

Colombia (alt. 3,400–4,000 ft.); (2) *A. peruvianus* Baillon is a tall tree with clear yellowish brown, hard wood and bright golden yellow, fragrant flowers, found in non-inundated forest in the upper Brazilian Amazon; (3) *A. trifoliatus* G. F. W. Meyer, the species upon which Meyer established the genus, is described as a tree 35 feet in height, from the region of the Río Essequibo, British Guiana, and from the Department of San Martín, Peru; (4) *A. obovatus* Bentham, a tree(?) collected by Spruce at Pacimoni and San Carlos, region of Rio Negro, upper Brazilian Amazon.

2. CARYOCAR L.

Small, medium-sized, or tall trees, rarely shrubs. Leaves opposite and often long-stalked; leaflets short-petiolulate or almost sessile, subcoriaceous or coriaceous, entire, dentate, serrate, or crenate, glabrous, tomentose, or pilose. Raceme short; flowers pale yellow or red, frequently of prominent size and attractive; calyx distinct. Fruit with glabrous or tomentose pericarp, and contains 4 or, through abortion, from 1–3, single-seeded, subreniform nuts; the endocarp consists of two layers, the outer soft and rich in oil, the inner one with long, tightly packed, slender processes which extend into the lumen of the nut and reach outwardly almost to the periphery of the outer layer.

Sapwood light-colored to pale brown; heartwood varies from oatmeal to pale yellow, dull grayish brown, or pale brown, sometimes with a pinkish cast, and not always sharply demarcated. Wood odorless and tasteless; straight-, roey-, or interwoven-grained; medium- to coarse-textured; fairly heavy and hard to decidedly heavy and hard; takes a smooth finish with a moderate luster; holds its place and color well, and sometimes has an oily appearance and a waxy feel; mostly durable and suitable for purposes requiring strength and resistance to moisture. Growth rings usually distinct. Parenchyma paratracheal and in fine network with rays, often producing a hoary effect. Pores of medium size to large; fairly numerous, not crowded; solitary or in radial multiples of 2–5, sometimes up to 8; most often filled with froth-like tyloses or dark gum deposit. Vessel lines moderately fine to coarse. Rays fine to very fine and invisible without lens on cross section, lighter-colored than the background, and closely and uniformly spaced; inconspicuous on other surfaces.

Vessel perforations simple, with a tendency to multiple; intervascular pits small to large and distinct, fairly numerous to numerous and crowded, in alternate arrangement, tending in some species

to scalariform. Rays heterogeneous; 1–4, mostly 2–3, cells wide, and up to 50, infrequently 200, cells high. Wood fibers occasionally in definite radial arrangement, fairly thick- to extremely thick-walled and with minute cavity; mucilaginous layers common in *C. glabrum;* pits simple to indistinctly bordered; septate fibers common. Crystals of calcium oxalate are common in *C. gracile* and *C. glabrum.* Pith flecks, sometimes present in *Anthodiscus montanus,* have not been observed in *Caryocar.*

Caryocar coccineum Pilger, Notizbl. Bot. Gart. Berlin 10: 127. 1927. *Almendro.*

Tall, forest tree of the lowland, frequently up to 95 feet in height. Crown spreading. Trunk straight, cylindrical, about 32 inches in diameter, free of branches up to half its height, and with small buttresses. Bark light brown to dark gray. Twigs glabrous. Leaflets coriaceous, elliptic, narrowly cuneate or sharply acuminate at apex, rounded at base; petiole moderately long. Flowers garnet to yellow in color; September–October. Drupe about 1 inch in width, and nuts contain a sweet, edible kernel.—Not common; among equally tall trees in forest free from inundations (alt. 400 ft.); reported also from the middle Marañón. Timber is sometimes used for fencing and house construction.

Sapwood dull pale yellow to light brown and tinged with extensive grayish areas; heartwood pale reddish or russet brown. Wood of medium weight, firm, and strong; straight- to irregular-grained; medium- to coarse-textured; holds its place well when finished; durable, although heartwood near the base is sometimes attacked by termites. Seasonal growth rings absent or present. Parenchyma fine and almost indistinguishable with lens. Pores large and readily visible without lens; fairly numerous, well distributed, and not crowded; solitary and oval to round in outline, less frequently in small radial multiples; open or closed. Vessel lines visible owing to white or dark brown deposits; tyloses also frequently present. Rays fine and discernible only with lens on cross section; indistinct or barely visible on tangential and radial surfaces.

Loreto: Fortaleza, lower Huallaga, *4425.*

Caryocar glabrum Pers. Syn. Pl. 2: 84. 1806. *Almendro de bajo.*

Tree, from 60 to 120, occasionally 150, feet in height. Crown dense, spreading. Trunk moderately straight or erect, cylindrical, from 30 to 40 inches or more in diameter, and free of branches for

upwards of half its height. Bark light to dark brown, fairly smooth or scaly. Leaflets glabrate, acuminate, acute at base, with undulating margins but not dentate, and veins prominent beneath. Flowers yellow. Drupe globose-ovate or irregular in shape, with 4 or, through abortion, 1–3 nuts; kernel edible.—Widely distributed in northeastern Peru; attaining its best development in forest free from seasonal inundations (alt. 400–500 ft.); reported also from San Carlos, Mapiri region, Bolivia (alt. 2,800 ft.), Colombia, Brazilian Amazon, and the regions of the Cuyuni, upper Mazaruni, Demerara, Pomeroon, and Waini rivers, also at Potaro and Curita in the Guianas. Timber is used locally for canoes and piling.

Sapwood white or pale yellow, occasionally with dark or almost black streaks, and not always sharply defined; heartwood grayish brown. Wood odorless and tasteless; roey- or straight-grained; medium-textured; decidedly heavy, hard, strong, and tough; not difficult to work and finishes smoothly; durable and suitable for purposes requiring strength and resistance to moisture. Growth rings indistinct to distinct. Parenchyma abundant; paratracheal and in numerous, fine, broken, tangential lines, not visible without lens. Pores appear as large pinholes; numerous; solitary or in radial multiples of 3–8; tyloses occasionally present. Vessel lines appear as distinct, rather long scratches, darker than background. Rays not visible without lens on cross and tangential sections; not very distinct on radial.

Vessels with simple perforations; intervascular pits alternate, very large, crowded, the apertures oval; vessel-ray pits (1) small to large, simple to half-bordered, and (2) tangentially elongated and tending to scalariform arrangement. Rays decidedly heterogeneous; mostly uniseriate, a few partly biseriate; cells filled with brown gum. Wood fibers polygonal in section, extremely thick-walled, often with mucilaginous layers, and small or minute lumina; pits inconspicuous and simple.

Loreto: Timbuchi, upper Nanay, *1000*.

Caryocar Tessmannii Pilger(?), Notizbl. Bot. Gart. Berlin 10: 126. 1927. *Almendron.*

Tree, 90 feet in height. Crown round. Trunk straight, cylindrical, 22 inches in diameter, unbranched for 35 feet, and with large surface roots. Bark medium or dark brown, rough. Flowers red. Drupe round, speckled brown; pulp rich in oil and is used locally to a limited extent for cooking and in native medicine; the kernel of the nut is

also edible; fruiting in January.—In sandy loam along edge of path in fairly dense forest (alt. 1,400 ft.).

Sapwood fairly well defined, moderately dark brown; heartwood pale yellow or light brown with a grayish tinge. Wood odorless and tasteless; roey- or irregular-grained; medium-textured; heavy and tenacious; not easy to work, takes a moderately smooth polish, and holds its place well when finished; subject to stain and insects, but strong and durable, especially in contact with moisture. Growth rings present owing to variation in abundance of elements. Parenchyma in association with pores, confluent, and in short, fine lines extending between the rays, or in irregular concentric lines or bands. Pores at limit of vision; fairly numerous and well distributed; solitary or in radial and diagonal multiples of 2–3; open or closed. Vessel lines distinct to rather coarse and darker than background; lustrous tyloses common. Rays numerous, very fine, closely spaced, and lighter-colored than adjacent fibers on cross section; indistinct or discernible to aided eye on other surfaces.

San Martín: Tarapoto, *6106*.

MARCGRAVIACEAE. Marcgravia Family

1. MARCGRAVIA L.

Small or large, epiphytic vines with fleshy, alternate leaves. Inflorescence umbel-like, the flowers long-stalked, the nectaries large, inverted helmet-shaped, pendent-like dippers. Fruit globose, coriaceous, indehiscent.

Wood medium to dark brown; very coarse-textured; light in weight. Parenchyma paratracheal; sparingly developed, indistinct. Pores large; numerous and scattered; solitary or, less often, in multiples or clusters; open. Rays large and coarse.

Vessel perforations scalariform or simple; intervascular and vessel-ray pits numerous, minute, and bordered. Rays heterogeneous. Wood fibers have numerous, minute, slit-like pits; often septate. Raphides present in the ray cells.

Marcgravia Williamsii Macbr. Candollea 5: 386. 1934. *Murcuhuasca*.

Rare vine, reaching up to the higher branches of tall trees, and with pendent branches. Bark deep pinkish or medium brown; inner bark dark chocolate brown. Flowers arranged in whorls; June–July.—Fairly common in the lowland (alt. 450 ft.).

Sapwood yellowish or pale reddish brown; heartwood deep pink when fresh, turning to chocolate brown after long exposure. Wood odorless and tasteless; straight-grained; moderately coarse-textured; fairly light in weight; inclined to be fibrous. Growth rings poorly defined or fairly distinct owing to variation in depth of color. Parenchyma paratracheal; sparingly developed and indistinct. Pores coarse and readily visible; numerous; mostly in radial multiples of 2–5, also solitary, seldom in small clusters; open or less often filled with yellowish white deposit. Vessel lines coarse, but not distinct; greenish gray and light to dark brown gum frequently present; vessel segments visible with lens. Rays mostly broad, lighter brown than the surrounding elements, and at limit of vision on cross section; indistinct on tangential; barely discernible with lens on radial surface.

Loreto: upper Nanay, *885*(?), *3269*.

THEACEAE. Tea Family

Shrubs or trees. Leaves alternate or opposite, usually leathery, entire or toothed, stalked, without stipules. Flowers axillary, small or large, regular; sepals and petals each 5; stamens numerous. Fruit capsular or leathery and indehiscent. The timbers are of little importance locally.

Woods yellowish or pale pinkish brown; heartwood sometimes well defined, reddish brown; odorless and tasteless; fairly fine- or medium-textured; of medium weight to rather heavy and tenacious; sometimes fibrous, but easy to work; fairly durable or durable. Parenchyma paratracheal; sparingly developed and indistinct. Pores of rather small to medium size; moderately few to numerous, well distributed; predominantly solitary, infrequently in small multiples or rows; usually open. Rays fine, as in *Bonnetia*, to rather broad on cross section; visible on tangential in *Ternstroemia;* fairly distinct or conspicuous on radial surface.

Vessel perforations scalariform or simple; vessel-parenchyma pits half-bordered and rather large. Rays heterogeneous; 1–5 cells wide. Wood fibers thick-walled, often in definite radial rows; pits numerous, fairly large, simple to bordered.

1. BONNETIA Mart. & Zucc.

Bonnetia paniculata Spruce in Benth. Journ. Linn. Soc. 5: 63. 1861. *Cascarilla.*

Small tree, approximately 25 feet in height. Crown flat or cone-shaped. Trunk straight, round, 9 inches or more in diameter, and unbranched for 5 or 6 feet. Bark dark pinkish or chocolate brown, and scaly; esteemed locally as a substitute for quinine. Leaves smooth, light or deep yellow. Fruit pale brown; December–January.—Of limited distribution; in sandy loam in open patches along summit and on hill slopes (alt. 1,600 ft.).

Sapwood constitutes most of the wood, deep yellowish brown; heartwood reddish brown. Wood odorless and tasteless; straight-grained; medium- or rather coarse-textured; moderately heavy and tenacious; not very easy to work, takes a smooth finish, and holds its place fairly well; immune to stain and insect attacks; durable. Growth rings absent. Parenchyma in association with pores and indistinct. Pores of medium size to fairly large; not very numerous and well distributed; solitary, infrequently in small multiples; open or closed. Vessel lines moderately fine, darker than background, and visible without lens; lustrous deposit common. Rays numerous, fine, and visible with lens on cross and tangential sections; slightly darker than background and faintly distinguishable without lens on radial surface. Rays heterogeneous; 1–3 cells wide. Wood fiber pits large, numerous, and in definite vertical alinement.

San Martín: Tarapoto, *5955*, *5974*.

2. TERNSTROEMIA Mutis

Ternstroemia sp. Tree, 32 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched for 13 feet. Bark yellowish or dark chocolate brown, fairly smooth, and with small lenticels.—Fairly common in the vicinity of Iquitos (alt. 400 ft.); in dry loam among shrubs and small trees of second growth.

Sapwood well defined, pale pinkish brown; heartwood reddish brown. Wood has no distinctive odor or taste; wavy-grained; fairly fine-textured; of medium weight or moderately heavy; not difficult to work and takes a smooth finish; checks in drying; fairly durable. Growth rings present, but poorly defined. Parenchyma indistinct. Pores fairly small; numerous and rather crowded; solitary, less frequently in radial or diagonal multiples or rows of 2, sometimes up to 4 or more; open. Vessel lines indistinct. Rays rather broad, lighter-colored than background, and visible without lens on cross section; discernible also on tangential; of darker color than adjacent elements and rather prominent on radial surface.

Vessels with scalariform perforations; vessel-ray pits rather large, half-bordered. Rays heterogeneous; 1–5 or more cells wide. Wood fibers thick-walled and with bordered pits.

Loreto: near Iquitos, *3673*.

GUTTIFERAE. Clusia Family

Shrubs or trees, sometimes epiphytic, rarely herbs. They are characterized by opposite and entire leaves, usually leathery, and without stipules, and a resinous, commonly yellow, sap. Flowers mostly of separate sexes, often large and showy, with 2–6 or more sepals, as many petals, and numerous stamens. Fruit capsular or drupaceous, dehiscent or indehiscent.

Sapwood varies from whitish to pale grayish brown, often with a pinkish tinge; heartwood often sharply defined, pinkish or reddish to dark brown. Wood light to rather heavy and hard; moderately fine- to fairly coarse-textured; some species inclined to be fibrous, easy to work, and often take a lustrous finish; fairly durable or durable. Parenchyma abundantly developed and distinct in most species, sometimes conspicuous to unaided eye on cross section; commonly appearing as numerous concentric lines or bands, often wavy and confluent, which invariably unite the pores and, at times, in wider bands completely enveloping them; in some species more definitely aliform to confluent, tending to form discontinuous and at times very irregular tangential bands; usually inconspicuous on longitudinal surfaces because of lack of color contrast with the background. Pores of medium size to large; rather few to numerous and usually well distributed through the ground mass; predominantly solitary, but occasionally in radial multiples or rows of 2–3, seldom more; often completely closed with tyloses or gum. Rays variable from fairly fine to distinct without lens on cross section; occasionally distinct on tangential; in some species lighter to decidedly darker than background on radial surface and usually distinct, producing fairly definite silver grain. Small radial canals have been observed in *Rheedia*.

Vessel perforations exclusively simple; intervascular pits of medium size, numerous, and often crowded, with rounded or polygonal borders, and narrow lenticular or oval apertures; vessel-ray pits simple and large to half-bordered and rather small. Rays heterogeneous; uniseriate (*Calophyllum*) or multiseriate (mostly from 2–7 cells wide), and from few to 90 cells or more high. Wood fibers with simple pits.

1. CALOPHYLLUM L.

Calophyllum brasiliense Camb. in St. Hil. Fl. Bras. Mer. 1: 321. 1825; Mart. Fl. Bras. 12, pt. 1: 398. 1888. *Jacare-úba, Lagarto-caspi blanco.*

Uncommon, glabrous tree, up to 120 feet in height. Crown open or conical. Younger parts of branchlets quadrangular. Trunk straight, columnar, up to 37 inches in diameter, and free of branches for about three-fourths the height. Bark dark brown or almost black and yields a small quantity of viscid, pale brown resin when incised. Leaves variable in shape, coriaceous, with a pale milky hue on the upper surface. Flowers in axillary or terminal racemes. Fruit globose, light green, reticularly wrinkled when dry. Although not as strong as the timbers used for similar purposes, the wood is esteemed locally for canoes, flooring, and interior construction.

Sapwood not distinctly demarcated, pinkish brown; heartwood reddish brown. Wood odorless and tasteless; straight-grained or moderately so; medium- to rather coarse-textured; of medium density and strong; saws rather woolly, but takes a smooth finish with a golden luster; durable. Growth rings occasionally present owing to variation in depth of color. Parenchyma distinguishable only with lens; paratracheal, confluent, and in fine, broken, tangential lines. Pores sometimes barely at limit of vision; fairly numerous and inclined to be in radial or oblique groups; solitary, less often in radial or tangential rows of 2; mostly open. Vessel lines long and prominent; tyloses often present. Rays very fine and barely distinguishable with lens on cross section; indistinct on tangential and radial surfaces.

Vessels with simple perforations; intervascular pits small, rounded, "screwhead" type. Rays heterogeneous with a tendency to homogeneous; uniseriate, few to 30 cells or more high. Wood fiber pits with slit-like apertures and indistinct, rounded borders.

Loreto: upper Nanay, *1015*.

2. CHRYSOCHLAMYS Poepp. & Endl.

Chrysochlamys Weberbaueri Engl. Bot. Jahrb. 58: Beibl. 130: 8. 1923.

Tree, from 12 to 25, sometimes 35 or 40, feet in height. Crown open, round, or conical. Trunk straight, round or compressed, slender, branching from near the base or clear of limbs up to 12 feet, and with small buttresses. Bark reddish or dark brown, fairly

smooth, scaly, or with shallow fissures, and yields when cut a small quantity of brown resin.—Very common; in either humid or dry loam in dense forest (alt. 380–3,000 ft.). Wood used mostly for fuel.

Sapwood grayish brown and darkening on exposure to a shade lighter than that of heartwood; heartwood reddish brown, thin, and perishable. Wood has no characteristic odor or taste; straight- or interlocked-grained; medium- or rather coarse-textured; light but firm to moderately heavy; saws rather woolly, easy to cut; lustrous when held to proper light; fairly durable. Growth rings absent or poorly defined. Parenchyma indistinct. Pores rather small or at limit of vision; fairly numerous or numerous and well distributed; often solitary, also in small radial multiples or rows; mostly open. Vessel lines fine, short, straight; lustrous tyloses commonly present. Rays either distinguishable only with lens or broad and distinct on cross section; indistinct or visible on tangential; often of darker color than background and prominent on radial surface; globules of dark reddish brown gum common.

Vessels with simple perforations; vessel-ray pits simple and elongated. Rays heterogeneous; 2–3 cells wide.

Loreto: near Iquitos, *1513;* Pebas, *1615, 1628, 1635, 1720, 1890;* Caballo-cocha, *2108.*—San Martín: San Roque, *6936.*

3. CLUSIA L.

Glabrous trees or shrubs, of interest chiefly because of their fig-like habit, being epiphytic on other trees at first, in age often standing alone. Leaves usually thick and leathery, hard when dried, and with numerous lateral nerves. Flowers often large and showy, whitish or pink, and with thick, fleshy petals. Fruit a leathery capsule, splitting at maturity into several segments, these radiating when open like the points of a star.

Sapwood whitish to pale pinkish brown, often with dark streaks and grayish cast; heartwood usually reddish brown. Wood moderately fine- to medium-textured; light to rather heavy; easy or moderately easy to work; durable. Parenchyma indistinct or scantily developed about the pores. Pores of medium size; fairly numerous and well distributed; predominantly solitary, seldom in small multiples; open or closed. Rays fine or very distinct on cross section; occasionally distinct on tangential; visible to unaided eye on radial surface.

Vessels with simple perforations; intervascular pits large, simple or somewhat bordered, often elongated laterally. Rays heterogene-

ous; 1–4 cells wide and many cells high; the cells thick-walled and often abundantly pitted. Wood fibers often in radial rows, many with gelatinous layer; pits simple or indistinctly bordered.

Clusia insignis Mart.(?), Nov. Gen. & Sp. 3: 164. 1817. *Renaco.*

Tall shrub or small tree, up to 20 or 25 feet in height, and usually epiphytic on other trees. Crown round to open and densely branched. Trunk often twisted, cylindrical, and branching from near the base.—Fairly common in the lowland; in pasture or along border of forest (alt. 380 ft.).

Sapwood almost white with pale brown or black streaks; heartwood brown, perishable. Wood heavy, hard, and tenacious.

Loreto: Caballo-cocha, *2188.*

Clusia penduliflora Engler in Mart. Fl. Bras. 12, pt. 1: 412. 1888. *Game, Sacha-indana.*

Tree, at times up to 50 feet in height. Crown spreading. Trunk straight, round, up to 12 inches in diameter, clear of limbs for 3 to 18 feet, and with buttresses 2 feet high. Bark dark grayish brown, fairly smooth, and exudes when cut a viscid latex which turns yellow on exposure. Flowers yellowish white; January–February.—In dense forest (alt. 3,500 ft.). Wood employed mostly for fuel.

Sapwood not distinctly demarcated, pale brown with a grayish tinge; heartwood reddish brown. Wood odorless and tasteless; irregular- or interlocked-grained; medium-textured; hard, heavy, and compact; suitable for purposes requiring strength and durability.

San Martín: San Roque, *7201, 7739.*

Clusia renggerioides Triana & Planch. Ann. Sci. Nat. IV. 13: 350. 1860. *Renaquillo.*

Tree, about 40 feet tall. Crown round, with many branches and dense foliage. Trunk contorted, about 27 inches in diameter, and branching from the base. Sapwood and bark yield a small quantity of insipid, yellow resin.—Uncommon; in open, dry loam and usually epiphytic on other trees.

Wood lustrous white or pale yellow, with extensive grayish areas or dark streaks caused by stain; not as heavy and hard as *C. Spruceana.* Pith fairly large, light or dark brown.

Loreto: Caballo-cocha, *2187.*

Clusia Spruceana Triana & Planch. Ann. Sci. Nat. IV. 13: 346. 1860. *Game, Renaquillo.*

Epiphytic tree, from 20 to 30 feet in height. Trunk compressed, about 8 inches in diameter, and branching a few feet above the ground. Bark about 0.75 inch thick, yellowish to dark brown. Wood, bark, and fruit yield a viscid, astringent, yellowish resin reputed to contain medicinal properties.—Common in the lower Peruvian Amazon; in open dry loam (alt. 380–450 ft.). Wood used occasionally for fuel.

Sapwood clearly demarcated, almost white or pale yellow with dark streaks or extensive grayish cast; heartwood pinkish or dark brown, perishable. Wood tasteless and odorless; irregular- or interlocked-grained; fine-textured; hard, heavy, and tough; not easy to cut, takes a smooth finish; liable to check in drying. Growth rings indistinct or barely visible. Parenchyma indistinct; paratracheal. Pores small; fairly numerous, evenly distributed; solitary or less frequently in radial multiples of 2, rarely in tangential pairs or small clusters; open or closed. Vessel lines short, indistinct. Rays distinguishable to unaided eye and evenly spaced on cross section; indistinct on tangential; light brown and distinct on radial surface.

Loreto: Caballo-cocha, *2190;* upper Itaya, *3189, 3507.*

4. RHEEDIA L.

Trees or shrubs with yellowish sap. Leaves decussate or verticillate. Flowers small, solitary, and in axillary fascicles. Fruit a berry, with a smooth, leathery skin, warty, or with teeth-like protuberances, containing 1–5 seeds, enveloped in a pulpy aril.

Wood varying between whitish and light or reddish brown, the heart sometimes well demarcated, pinkish or reddish brown; medium-textured; of medium weight to heavy; brittle and slightly fibrous; appears to be durable. Parenchyma paratracheal and in irregular, tangential bands, forming a network with the rays, less often in closely or widely spaced, fairly continuous, concentric bands. Pores of medium size; moderately numerous or numerous and well distributed; solitary or in multiples, seldom in radial rows; open or closed. Rays fairly fine or moderately distinct and slightly wavy on cross section; indistinct on tangential; occasionally distinct on radial surface.

Vessels with simple perforations; intervascular pits numerous and irregularly arranged; vessel-parenchyma pits often elongated. Rays heterogeneous; 2–5 cells wide; some of them contain small radial canals.

Rheedia floribunda (Miq.) Triana & Planch. Ann. Sci. Nat. IV. 14: 319. 1860. *Brea-huayo, Charichuela.*

Tree, from 35 to 55 feet in height. Crown round or pyramidal. Trunk straight, round, from 8 to 12 inches in diameter, and unbranched for from 6 to 24 feet. Bark reddish or purplish brown, with low ridges or small fissures; bark and fruit yield a sweet, yellowish resin, which is reputed to be beneficial for cataracts and other eye ailments. Flowers small, pale yellow. Fruit ovoid-round, brown when mature, and borne on the main branches; January–April.—Widely distributed, but nowhere common; along margin of dense forest or in sandy loam among shrubs and small trees (alt. 400–1,400 ft.).

Wood white when freshly cut, turning to pale brown on exposure; has no distinctive odor or taste; straight- or interwoven-grained; medium-textured; heavy, compact, and moderately hard; not easy to work and takes a smooth, dull finish; appears to be durable. Growth rings present or poorly defined. Parenchyma paratracheal, at times uniting the pores, also in numerous, short, irregular, tangential lines extending between and forming a network with the rays, and less often in continuous, concentric bands which appear to indicate limit of growth rings; producing a hoary effect when seen under lens on cross section. Pores small; fairly numerous, well distributed; solitary or less frequently in radial rows or multiples of 2–3; open or closed. Vessel lines fine, but discernible without lens; sometimes filled with dark brown gum. Rays numerous, moderately fine, rather wavy, and sometimes distinguishable to unaided eye on cross section; indistinct on tangential; of lighter color than background and discernible only with lens on radial surface.

Loreto: Pebas, *1580.*—San Martín: Tarapoto, *6616.*

Rheedia macrophylla (Mart.) Triana & Planch. Ann. Sci. Nat. IV. 14: 309. 1860. *Charichuela.*

Tree, approximately 75 feet in height. Crown conical. Trunk straight, round, 16 inches in diameter, and unbranched up to half the entire height. Bark reddish or chocolate brown, scaly or with low ridges, and secretes when cut a small quantity of yellow resin used for calking canoes.

Sapwood well demarcated, pale brown; heartwood pinkish brown, thin. Wood odorless and tasteless; straight- or interwoven-grained; medium-textured; of medium weight or moderately heavy; inclined to be fibrous, easy to cut, takes a rather dull finish; durable. Growth

rings present owing to alinement of parenchyma. Rays visible to unaided eye on radial surface. Pith pale brown; small radial intercellular canals present.

Loreto: upper Nanay, *921*.

5. SYMPHONIA L. f.

Symphonia globulifera L. f. Suppl. 302. 1781. *Brea-caspi.*

Forest tree, up to 120 feet in height. Crown flat. Trunk straight or moderately so, columnar, 27 inches or more in diameter, clear of limbs for about two-thirds the entire height, with strong, laterally compressed surface roots and fairly large buttresses. Bark pinkish or dark brown, up to 0.5 inch thick, rough, and when cut secretes a yellowish resin of a waxy consistency, which turns black after long exposure to air and is used for calking canoes. Leaves opposite, lanceolate-oblong, with blunt tip, leathery or subleathery, short-stalked, and without stipules. Flowers globose and red, borne in umbelliferous groups on the short lateral twigs; stamens numerous and united by their filaments in a tube swollen at the base. Fruit an ovoid berry, dark green when unripe, brown, fleshy, and edible when mature; July–August.—Not common; in slightly humid loam (alt. 400 ft.). The strong, durable timber is used for house posts and general carpentry.

Sapwood not sharply defined, creamy yellow and with slightly darker streaks; heartwood yellowish or pale brown. Wood has a strongly fetid odor when fresh, odor and taste not distinctive in dried material; mostly straight-grained; of medium weight to rather heavy; not difficult to work; inclined to check in drying; immune to insect attacks. Growth rings indicated by unusual regularity of parenchyma lines. Parenchyma abundantly developed; in numerous concentric lines or bands, often wavy and confluent or enveloping the pores, at times in discontinuous, short, and very irregular tangential lines; lighter in color than fibers and distinguishable to unaided eye. Pores of medium size; rather few, well distributed; solitary, in radial pairs, or in small clusters; open or often filled with tyloses in heartwood. Vessel lines fairly fine, of same color as background, but distinguishable to unaided eye owing to distinct luster of tyloses. Rays fine or moderately so, numerous, and of same color as background on cross section, indistinct or barely visible without lens on moistened surface; indistinct on tangential; lighter or darker than background on radial surface, sometimes producing fairly definite silver grain in heartwood.

Vessels with exclusively simple perforation plates; intervascular pits of medium size, numerous, and often crowded, with rounded or somewhat oval borders and slit-like apertures; vessel-ray pits definitely bordered. Rays heterogeneous, with a tendency to homogeneous; 1–6 cells wide and few to about 90 cells high. Wood fibers with simple pits.

Loreto: Caballo-cocha, *2263*.

HYPERICACEAE. St. Johnswort Family

1. VISMIA Vand.

Shrubs or small trees with orange-colored sap exuding from the bark. Leaves opposite, entire, somewhat tomentose beneath, and without stipules. Flowers inconspicuous, in terminal cymes; sepals and petals each 5; stamens numerous and arranged in 5 clusters. Fruit a berry, 3–5-celled. There are many species of *Vismia* in tropical America, usually encountered in thickets. The timber is used only locally, principally for fuel. The common name in northern Peru for all species of *Vismia* is "pichirina."

The trees range in height from 15 to 35, seldom up to 45, feet. Crown spreading. Trunk straight or slightly contorted, round, slender, and unbranched up to half the height, infrequently bifurcating 2 or 3 feet from the base. Bark pinkish or reddish to chocolate brown, fissured, and yields when cut a yellowish sap, which turns brown on exposure to sunlight and air.—Very common in the lowland (alt. 350–550 ft.); in open dry patches among shrubs and small trees, in pastures, along margin of forest growth, infrequently aquatic.

The woods suggest *Calophyllum* in their properties and structure. Sapwood pinkish brown, often with a grayish cast; heartwood reddish or dark brown. Wood medium- to fairly coarse-textured; moderately light to medium in weight; inclined to be fibrous, brittle, easy to work, and takes a fairly lustrous or lustrous finish; moderately durable. Parenchyma in fine, broken or continuous, concentric bands or lines, often enveloping the pores and sometimes forming a network with the rays. Pores of medium size to large; few to fairly numerous, scattered without definite arrangement or tending to be in concentric zones; predominantly solitary or in radial rows, seldom in multiples or small clusters; mostly open. Rays fine or moderately fine on cross section; occasionally visible to unaided eye on tangential; distinct and often producing a silver grain on radial surface.

Vessels with exclusively simple perforation plates; vessel-parenchyma pits usually small but distinct, simple to half-bordered. Rays heterogeneous; mostly from 2–4 cells wide.

Loreto: lower Itaya, *41*, *136;* upper Itaya, *3310*, *3324*, *3366*, *3396;* lower Nanay, *357*, *486;* middle Nanay, *1144;* upper Nanay, *966*, *1205*, *1292;* near Iquitos, *1460*, *1533*, *7962;* Pebas, *1639*, *1734*, *1748*, *1793;* Caballo-cocha, *2061*, *2074*, *2077*, *2191*, *2192*, *2194*, *2211*, *2364;* La Victoria, *2674*, *2691;* lower Huallaga, *3821*, *3827*.

BIXACEAE. Anatto Family

1. BIXA L.

Bixa Orellana L. Sp. Pl. 512. 1753. *Achiote, Achiote blanco, Achiote colorado, Shambu, Shambu-huayo, Shambu-quiro.*

Shrub or small tree, from 10 to 25, sometimes up to 35, feet in height. Bark thin, light to dark brown; inner bark fibrous, suggesting basswood (*Tilia*), and is sometimes used for cordage. Young shoots covered with small rusty scales. Leaves alternate, broadly ovate, acuminate, truncate or rounded at base; stipules deciduous. Flowers in compact terminal panicles, pale yellowish white or pinkish, fairly large, and with greenish filaments. Capsule 2-valved, subglobose or ovoid, with flexible, spinose bristles; the numerous seeds, about the size and shape of grape seeds, are imbedded in a fleshy, slightly sticky, bright orange- or vermilion-colored pulp, which yields anatto dye used by the natives in soups, for painting their bodies partly for ornament and partly against insect bites, and for dyeing the palm fiber that is employed for making hammocks and dresses.

Wood pinkish yellow; has no characteristic odor or taste; straight-grained; medium- to coarse-textured; has the consistency of basswood (*Tilia*); easy to work and takes a fairly lustrous finish; perishable. Growth rings distinct owing to variation in depth of color. Parenchyma metatracheal; in very numerous, fine, short, wavy lines. Pores small; scattered; in radial multiples of 2–4 or solitary; open. Vessel lines of darker color than background. Rays fine or moderately fine on cross section; sometimes discernible without lens on radial. Ripple marks present, fairly regular and distinct, with all elements storied, although some of the rays occupy two stories; number per inch length, about 80.

Vessels with scalariform perforations, with a tendency to simple; vessel-parenchyma pits simple or half-bordered. Rays heterogeneous; 2–6 cells wide. Wood fibers have simple pits.

Loreto: lower Itaya, *184;* lower Nanay, *354, 355;* Pebas, *1264, 1583;* Caballo-cocha, *2082, 2193;* La Victoria, *3063;* Yurimaguas, lower Huallaga, *3987, 4615.*—San Martín: Tarapoto, *5549.*

COCHLOSPERMACEAE. Cochlospermum Family

1. COCHLOSPERMUM Kunth

Medium-sized or tall trees. Leaves alternate, long-stalked, palmately lobed. Flowers in terminal clusters, bright yellow, being strikingly suggestive of roses, and often appear when the trees are devoid of leaves. Fruit a thin-walled capsule; the numerous seeds covered with short silky hairs similar to the fiber furnished by some of the Bombacaceae. The trees are of rapid growth and are frequent in thickets or open forest. Bark secretes a small amount of yellowish resin and the fibrous inner bark is employed for cordage. The timber is not utilized.

Wood white or pale brown; very coarse-textured; light, soft, spongy, laminated, and brittle; requires a sharp knife to cut smoothly across grain; perishable. Parenchyma metatracheal; in broad, irregularly spaced, concentric lines of darker color than background. Pores not numerous; solitary or in multiples; open or filled with gum. Rays broad on cross section; fairly distinct on tangential; producing a silver grain on radial surface. Ripple marks present; all elements storied.

Vessel lines in part simple to scalariform; vessel-ray and vessel-parenchyma pits simple. Rays heterogeneous; multiseriate.

Cochlospermum orinocense (HBK.) Steud. Nom. ed. 2. 1: 393. 1840. *Huimba, Huina-caspi, Quillo-sisa.*

Deciduous tree, from 42 to 75, occasionally up to 90, feet tall. Crown moderately flat or spreading. Trunk erect, round, about 30 inches in diameter, and free of limbs up to half the height. Bark thick, dark brown, spinous, and secretes a small amount of yellowish resin. Leaves digitate, long-stalked. Flowers large, bright yellow, and showy, whence the vernacular name "quillo-sisa" ("quillo"=yellow; "sisa"=flower). Fruit a 3-valvate, ovoid capsule, yellow when mature, and with dense brown pubescence; seeds covered with a silky fiber employed locally to a limited extent for filling pillows and mattresses.—Abundant in both the lowland and upland (alt. 500–1,500 ft.); in thickets and old clearings, usually in dry loam.

Sapwood thick, pale yellowish or light pinkish brown; heartwood reddish brown. Wood tasteless, but slightly fragrant when fresh;

straight-grained; medium- to coarse-textured; light and soft; easy to work, but requires a sharp knife to cut smoothly across grain; perishable. Growth rings indistinct or poorly defined. Parenchyma occasionally visible; in concentric terminal bands or, in some specimens, in very fine, tangential lines extending between the rays. Pores at limit of vision; not numerous, uniformly distributed; mostly in radial multiples of 2–5, less frequently solitary or in small clusters; mostly open. Vessel lines long and coarse; often filled with brown deposit. Rays at limit of vision on cross section; faintly distinguishable on tangential; lighter or darker than background and rather distinct on radial surface. Ripple marks present, but often indistinct; number per inch length, up to about 120.

Loreto: upper Itaya, *3485;* lower Huallaga, *3991.*—San Martín: Tarapoto, *6664.*

Cochlospermum Williamsii Macbr. Candollea 5: 388. 1934.

Handsome tree of the lowland, said to attain a height of up to 95 feet. Crown flat or round. Trunk straight, cylindrical, from 10 to 20 inches in diameter, and clear of limbs for one-third or two-thirds the height, not buttressed. Leaves from 3–8 inches long and 2–4 inches broad, elliptic, short-cuneate at base, short-acuminate at apex, chartaceous-membranaceous. Flowers yellow, showy, short-stalked; sepals imbricate. Capsule obconical, brown-tomentose, truncate-depressed at apex, filled with silky fiber.—Fairly abundant in the lower Peruvian Amazon (alt. 380 ft.); in dry clearings or along margin of forest.

Loreto: Pebas, *1778, 1964;* Caballo-cocha, *2090.*

VIOLACEAE. Violet Family

Herbs, shrubs, or small trees, sometimes woody vines. Leaves simple, toothed, provided with stipules. Flowers usually small, with 5 sepals, 5 petals, which often are unequal, and 5 stamens. Fruit a 1-celled capsule, opening by 3 valves.

Wood creamy yellow, occasionally pale pinkish or light brown; heartwood sometimes well defined in *Paypayrola* and *Rinorea*, pale purplish; odorless and tasteless; very fine- or fine-textured; of medium density; easy to work; fairly durable. Parenchyma sparingly developed; paratracheal and indistinct in *Gloeospermum*, *Paypayrola*, and *Rinorea*, and in numerous, very fine lines extending between the rays in *Leonia*. Pores minute or small; numerous or fairly numerous and well scattered; solitary or in multiples or rows; open

or closed. Rays appear to be of two sizes, the smaller ones visible only with lens on cross section, the larger distinct to unaided eye and slightly sinuous; invisible without lens on other surfaces.

Vessel perforations scalariform; intervascular pits small to large, often elongate. Rays heterogeneous; uniseriate or partly biseriate in *Gloeospermum*, or up to 4 cells wide as in *Rinorea*, and few to 100 cells high. Wood fibers thick-walled.

1. GLOEOSPERMUM Triana & Planch.

Gloeospermum Sprucei Eichl. in Mart. Fl. Bras. 13, pt. 1: 390. 1871.

Small tree, approximately 16 feet in height. Crown conical. Trunk straight, round, slender, and unbranched for 6 feet. Bark medium chocolate brown, sometimes with a pale greenish tinge, fairly smooth, and thin. Fruit round, dark green; June–July.—Uncommon; in moderately dense, flood-free forest (alt. 400 ft.).

Wood uniform pale yellowish or light brown; odorless and tasteless; moderately straight-grained; uniformly fine-textured; of fairly light or medium weight; inclined to be splintery; easy to cut, takes a smooth polish with a moderate luster, and holds its place and color well; fairly durable. Growth rings present. Parenchyma paratracheal and in numerous, very fine lines extending tangentially between the rays; barely distinguishable with lens. Pores minute or very small; fairly numerous, well scattered; solitary or in small radial multiples or rows. Vessel lines indistinct. Rays very fine or fairly fine, numerous, wavy, lighter-colored than adjacent elements, and at limit of vision on cross section; indistinct on tangential; discernible on radial surface when held to proper light.

Vessels with scalariform perforation plates. Rays heterogeneous; uniseriate or partly biseriate and up to 20 cells or more high.

Loreto: Pebas, *1935*.

2. LEONIA Ruiz & Pavón

Leonia glycycarpa Ruiz & Pavón, Fl. Per. 2: 69. 1799. *Ninacaspi, Urcu-tamara.*

Slender, glabrous tree, up to 60 or 70 feet in height. Crown spreading. Trunk erect, columnar, from 10 to 24 inches in diameter, and clear of limbs for half the height. Bark greenish or pinkish to dark brown. Leaves ovate or oblongate, acuminate at apex, acute or rounded at base, subcoriaceous. Flowers borne on trunk. Fruit light green, round, and containing numerous seeds.—Common

between Iquitos and the Peruvian-Brazilian frontier (alt. 400 ft.); in forest free from periodical inundations. Timber is esteemed for house construction, general carpentry, and fuel.

Wood oatmeal-colored or pale creamy yellow, with no distinction between sap and heart; has no characteristic odor or taste; straight- or irregular-grained; uniformly fine-textured; light or moderately heavy, strong, and compact; easy to work and takes a smooth finish; liable to check in drying; fairly durable, but subject to stain. Growth rings barely visible owing to slight variation in depth of color. Parenchyma indistinct. Pores small; numerous, well scattered or tending to crowd; in radial multiples or rows of 2–4, infrequently up to 8 or solitary; mostly open. Rays fine or barely visible on moistened cross section; indistinct without lens on other surfaces.

Vessel perforations scalariform. Rays distinctly heterogeneous; 2–4 cells wide and up to 60 cells high. Wood fibers thick-walled, with numerous large pits.

Loreto: lower Itaya, *22;* Pebas, *1604;* middle Nanay, *3191;* near Iquitos, *8014.*

3. PAYPAYROLA Aubl.

Paypayrola grandiflora Tul. Ann. Sci. Nat. III. 7: 371. 1847.

Shrub, up to about 15 feet tall. Trunk round, slender, and branching from near the base. Bark grayish or reddish brown, scaly or with low ridges. Flowers pale yellow; June–July.—Forming undergrowth in dense forest (alt. 380 ft.).

Wood uniform creamy yellow throughout; odorless and tasteless; interlocked-grained; fine- or medium-textured; of light or fairly medium weight and brittle; takes a dull polish; liable to check in drying; moderately durable. Growth rings absent or poorly defined. Parenchyma sparingly developed; paratracheal, diffuse, or terminal. Pores very small; fairly numerous and uniformly scattered; solitary or in radial, infrequently diagonal or tangential, rows or multiples of 2–6; open. Vessel lines very fine and distinguishable only with lens; lustrous tyloses frequently present. Rays wavy and lighter-colored than fibers, the larger conspicuous on cross section; indistinct on other surfaces.

Vessels with scalariform perforations; intervascular pits elongated and distinct; vessel-ray pits of same size as intervascular. Rays heterogeneous; 2–3 cells wide and up to 50 cells high, cells rather large. Wood fibers fairly thick-walled.

Loreto: Caballo-cocha, *2359.*

4. RINOREA Aubl.

Slender shrubs or small to medium-sized trees. Leaves opposite, short-stalked, thin, acuminate, obscurely serrate or almost entire; stipules small, deciduous. Flowers very small, in racemes or panicles; sepals 5, equal; petals 5, recurved at the apex; stamens 5. Fruit a strongly compressed capsule. Wood not used locally to any extent.

Sapwood creamy yellow or pale grayish to light brown; heartwood sometimes well defined, purplish or dark brown, sometimes streaked. Wood odorless and tasteless; fine-textured; easy to work; liable to check in drying; moderately durable. Parenchyma paratracheal; sparingly developed and often indistinct. Pores small or minute; numerous or fairly numerous and well scattered; solitary or in multiples or rows; open or closed. Rays appear to be of two sizes: the larger distinct and visible without lens, the smaller fine and discernible only with lens on cross section; often visible without lens on other surfaces.

Vessel segments elongate; vessel perforations simple; intervascular pits small, elongate. Rays heterogeneous; 1–4 cells wide and up to 100 cells high. Wood fibers moderately thick-walled.

The following numbers of the genus *Rinorea* remain to be determined specifically:

Loreto: upper Itaya, *3244;* lower Huallaga, *4127, 4355, 4865, 4881, 5088, 5210.*

FLACOURTIACEAE. Flacourtia Family

Trees or shrubs. Leaves simple, alternate, entire or toothed, stalked, often with translucent dots and lines; stipules usually minute or wanting. Flowers small; perfect or of separate sexes; calyx 3–7-lobed or of 3–7 distinct sepals; the petals of the same number as the calyx segments, or sometimes absent. Fruit a 1-celled capsule or berry. Some of the genera have edible fruits, others yield tanning materials as well as oils, drugs, and resins of medicinal value.

Woods variegated in color; sapwood ranging from oatmeal or yellowish to pale brown, often with grayish to pinkish streaks or cast; heartwood reddish, purplish, or dark brown. Wood fine- or medium-textured; light and soft to moderately heavy or heavy; sometimes slightly fibrous, easy to work, has no distinctive figure; some species susceptible to stain and insects; perishable or fairly durable to durable. Parenchyma sparingly developed; in very fine lines extending between the rays, often indistinct; in a few species in

fine concentric lines; rarely paratracheal. Pores small or very small to medium-sized; few to numerous, diffuse; solitary, less frequently in small radial multiples, seldom in small radial rows or small clusters; mostly open. Rays in several species appear to be of two sizes, ranging from fine to fairly broad, numerous, closely spaced, and wavy on cross section; seldom visible on tangential; fairly distinct to distinct on radial surface.

Vessels have simple perforations, with some tendency to scalariform, particularly in the region of the primary wood (in *Banara* and *Casearia*); intervascular pits small to fairly large, with round, ovoid, or hexagonal margins and slit-like or lenticular apertures; vessel-ray pits simple to half-bordered. Rays heterogeneous; mostly from 1–4, in *Patrisia* up to 14, cells wide and few to 75 cells or more high. Wood fibers have simple pits; sometimes septate.

1. BANARA Aubl.

Tall shrubs or small to medium-sized trees. Leaves serrate. Flowers in terminal panicles. Fruit leathery or fleshy, indehiscent, often pulpy within; seeds numerous.

Wood oatmeal-colored, yellowish, or light brown with a pinkish or grayish tinge; medium-textured; of light to medium weight; slightly fibrous, brittle, easy to work; checks in drying and subject to stain. Parenchyma indistinct; paratracheal. Pores of medium size to fairly large; moderately numerous, diffuse; in radial multiples or rows, less often solitary, seldom in small clusters. Rays fine, numerous, closely spaced on cross section and sinuous, especially at point of contact with the pores; indistinct on tangential; sometimes distinct on radial surface.

Vessels with simple perforations; intervascular pits numerous, small. Rays heterogeneous; 2–3, seldom 4, cells wide.

Banara guianensis Aubl. Pl. Guian. 1: 548. *pl. 217*. 1775. *Machinmangua, Raya-caspi.*

Tall shrub or small tree, often straggly, up to 20 feet in height. Crown open. Trunk round and slender. Leaves elliptic-oblong to ovate, subcoriaceous, tomentose, acuminate at apex, rounded or subcordate at base. Flowers in short, terminal panicles. Fruit capsular, subrounded, 1-seeded, dark brown; seeds black.—Common in the lower Huallaga (alt. 500 ft.); along margin of forest or in thickets; collected also along river banks at Puerto Bermudez and Puerto Yessup, Department of Junín. Timber is used for sugar boxes.

Sapwood not sharply defined, uniform pale brown or yellowish white; heartwood pale gray. Wood has no distinctive odor or taste; straight-grained; uniformly fine-textured; moderately heavy, firm, and brittle; cuts easily and is capable of taking a smooth finish. Growth rings present. Parenchyma indistinct. Pores of medium size; rather numerous and evenly distributed; solitary or in radial rows or multiples of 2–4 or more; mostly open. Vessel lines fine and slightly darker brown than background; small crystalline deposits frequently present. Rays indistinct or at limit of vision on cross section; indistinct on tangential; of same color as surrounding elements, but discernible to unaided eye, on radial surface.

Loreto: lower Huallaga, *4014*, *4978*, *5321*(?), *5365*.

Banara mollis Tul. Ann. Sci. Nat. III. 7:288. 1847. *Borracho-sisa.*

Small, straggly tree, about 18 feet in height. Crown spreading. Trunk slender, appressed, and clear of limbs for about 4 feet. Bark light brown; inner bark separates into thin flakes.—Of limited distribution; in dry forest loam (alt. 3,000 ft.). Wood is not used locally.

Wood white with grayish or brown streaks; light in weight, but firm; saws rather woolly, easy to cut; not durable.

San Martín: San Roque, *7031*.

Banara nitida Spruce in Benth. Journ. Linn. Soc. 5, Suppl. 2: 93. 1861.

Tree, attaining a height of up to 60 feet. Crown flat. Trunk straight, cylindrical, from 10 to 12 inches in diameter, and clear of limbs up to half the height.—In upland forest (alt. 1,300–3,000 ft.). Wood is used for general carpentry and kindling.

Wood light brown throughout with pale grayish cast, occasionally with dark streaks; straight- or irregular-grained; fine- or moderately fine-textured; firm and of about the same density as *B. guianensis;* brittle, saws slightly woolly; liable to check in drying.

San Martín: Tarapoto, *6530;* San Roque, *6986*.

2. CARPOTROCHE Endl.

Shrubs or small to medium-sized trees. Leaves large, short-stalked. Flowers usually dioecious. Fruit leathery or woody, dehiscent or indehiscent; seeds large and numerous.

Wood pale yellow to pinkish brown and darkening on exposure; fine-textured; of light to medium weight or moderately heavy;

slightly fibrous, sometimes capable of taking a smooth polish; susceptible to stain; moderately durable or durable. Parenchyma indistinct. Pores small; numerous, diffuse; solitary or in radial multiples or rows; open. Rays fine or moderately fine and apparently of two sizes, numerous, and closely spaced on cross section; indistinct on tangential; distinct on radial.

Vessels with scalariform perforations, with 5–8 bars; vessel-ray pits simple. Rays heterogeneous; 1–3 cells wide. Wood fibers with fairly large, simple pits; septate.

Carpotroche longifolia (Poepp. & Endl.) Benth. Journ. Linn. Soc. 5, Suppl. 2: 82. 1861. *Huira-huayo, Zapote del mono.*

Slender tree, from 12 to 20 feet high. Crown spreading or conical and with elongated branches. Trunk straight, slender, and free of branches for 2 or 3 feet. Bark thin, reddish to dark chocolate brown, fairly smooth or with small excrescences. Leaves obovate-oblong to oblanceolate, short-acuminate. Flowers in clusters attached to trunk and main branches; petals white; stamens yellow, white, or pink; June–July.—Common in the lowland; along margin of or in dense forest growth (alt. 400 ft.). Timber is not used locally.

Sapwood pinkish brown to pale yellow; heartwood thin, dull brown, occasionally with extensive grayish areas. Wood has a slightly offensive odor; straight- or wavy-grained; not as fine-textured as *C. parvifolia;* light in weight or moderately so; takes a smooth and fairly lustrous finish. Rays of two sizes, numerous, closely and evenly spaced on cross section, the larger barely visible to unaided eye; indistinct on tangential; slightly darker than background and rather prominent on radial.

Vessel perforations scalariform; vessel-ray pits simple. Rays heterogeneous; 1–3 cells wide. Wood fibers with fairly large pits; often septate.

Loreto: lower Nanay, *625;* Pebas, *1801;* Caballo-cocha, *2131;* La Victoria, *2711.*

Carpotroche parvifolia Macbr. Candollea 5: 390. 1934. *Casha-huayo.*

Uncommon forest tree, approximately 70 feet in height. Crown conical. Trunk erect, cylindrical, 12 inches or more in diameter, and clear of branches for one-third the height. Bark grayish brown. —In slightly humid loam (alt. 500 ft.). Timber is used to a limited extent for piling and in house construction.

Wood pale yellow with pale purplish or reddish brown streaks; odorless and tasteless; interlocked-grained; uniformly fine-textured; rather heavy, hard, and strong; easy to work and holds its place well when finished; durable. Growth rings occasionally present owing to slight variation in depth of color. Parenchyma indistinct. Pores small and visible only with lens; fairly numerous, evenly scattered; solitary, less frequently in radial rows of 2–3; mostly open. Vessel lines fine, short, and of same color as background. Rays fine, closely spaced, discernible only with lens on cross section; indistinct on tangential; of same color as adjacent elements, but distinguishable on radial surface.

Loreto: lower Huallaga, *5260*.

3. CASEARIA Jacq.

Shrubs or small trees. Leaves either entire or toothed, usually with translucent dots or lines. Flowers small, white, arranged in clusters or umbels in the leaf axils or along the older branches; petals none. Fruit a 3–4-valved, dry or fleshy capsule, usually red at maturity; seeds several or many, covered by a fleshy aril.

Wood whitish to pinkish, often with grayish streaks; heartwood purplish to dark chocolate brown. Wood fine- or fairly fine-textured; of medium weight to rather heavy, hard, and compact, and well suited for turnery; easy to work, capable of taking a smooth, fairly lustrous or highly lustrous polish; sometimes liable to stain in drying. Parenchyma in numerous, fine, tangential or oblique lines. Pores of small or medium size; numerous, diffuse; solitary or in radial multiples or rows; seldom filled with calcium deposit. Rays fine or moderately fine on cross section; occasionally distinct on radial.

Vessel perforations simple, tending at times to scalariform; intervascular pits very small, with slit-like apertures which may extend beyond the borders and may coalesce into spirals; vessel-ray pits very small, half-bordered. Rays heterogeneous; 2–4 cells wide, up to 75 cells high, and often crowded. Wood fibers have simple pits; often septate.

Casearia Blanchetiana Miq. Linnaea 22: 801. 1849. *Uchumullaca*.

Medium-sized tree, up to 65 feet in height. Crown spreading. Trunk erect, moderately round, from 10 to 15 inches in diameter, with small buttresses, and free of branches for almost two-thirds

the height. Bark pale gray to purplish brown, moderately smooth, and secretes a small amount of translucent, insipid resin.—Fairly abundant in the upper Itaya (alt. 450 ft.); in flood-free forest.

Sapwood pale brown throughout when fresh, yellowish or pinkish brown when dried; heartwood pale pinkish brown; straight-grained; fine- to medium- and uniform-textured; moderately heavy to heavy and compact; saws slightly woolly, but capable of taking a smooth and highly lustrous finish; liable to check in drying; not resistant to termite attacks. Growth rings absent or poorly defined. Parenchyma indistinct even with lens. Pores small; very numerous; in radial rows or multiples of 2–8; mostly open. Vessel lines fine, but readily visible against the light-colored background; grayish white deposit occasionally present. Rays indistinct to unaided eye on cross and tangential sections; darker than background and readily visible on radial surface.

Loreto: San Antonio, upper Itaya, *3393*.

Casearia iquitosensis Macbr., ined.

Shrub, from 8 to 18 feet tall. Bark thin, grayish to dark reddish brown, fairly smooth.—Common near Iquitos (alt. 400 ft.); in clearings, thickets, or along border of forest growth.

Sapwood pale pinkish brown; heartwood thin, dull dark brown. Wood straight- to irregular-grained; uniformly fine-textured; heavy, tough, and strong; cuts easily; probably durable. Growth rings present. Rays prominent in some specimens on radial surface.

Loreto: near Iquitos, *3773*, *7975*, *8015*.

Casearia javitensis HBK. Nov. Gen. & Sp. 5: 366. 1823.

Uncommon forest tree, from 30 to 35 feet in height. Crown spreading. Trunk straight, columnar, 6 inches or more in diameter, and free of limbs for about one-third the height. Timber is used to a limited extent for house construction.

Wood uniform light brown or pinkish brown; straight-, roey-, or irregular-grained; uniformly fine-textured; rather heavy and moderately hard; fairly easy to work, takes a smooth finish; liable to check in drying. Growth rings occasionally present on account of variation in depth of color. Rays prominent on radial surface.

Loreto: Yurimaguas, lower Huallaga, *4590*.

Casearia macrophylla Vahl(?), Eclog. Am. 2: 32. 1798.

Uncommon forest tree, seldom more than 20 feet in height. Crown spreading. Trunk erect, columnar, from 5 to 8 inches in

diameter, and branching about 5 feet from the base. Bark thin, yellowish to pale grayish brown, fairly smooth. Timber is used for fuel only.

Sapwood not distinctly demarcated, pale yellow to cream-colored, occasionally with pinkish brown streaks; heartwood dull gray. Wood has a slightly offensive odor when fresh; straight- or interlocked-grained; fine-textured; moderately light, but strong. Rays indistinct to unaided eye on all surfaces.

Loreto: Santa Rosa, lower Huallaga, *4934*.

Casearia parvifolia Willd. Sp. Pl. 2: 628. 1799. *Tortuga-caspi.*

Tree, about 25 feet in height. Crown spreading. Trunk straight, round, 7 to 10 inches in diameter, and free of limbs for 5 feet. Bark up to 1 inch thick, pale grayish yellow or brown, scaly. Flowers white, fragrant.—In scant growth, close to bank of the Mayo River (alt. 1,600 ft.).

Wood pale yellow or pink; straight- or interlocked-grained; very fine-textured.

San Martín: upper Huallaga, *6219*.

Casearia Poeppigii Eichl. in Mart. Fl. Bras. 13, pt. 1: 475. 1871. *Llajas.*

Tree, ranging in height from 20 to 90 feet. Crown spreading. Trunk straight, round, up to 16 inches in diameter, and clear of limbs for about one-third the height. Bark moderately thin, pale gray to grayish brown, with fine, shallow, transverse fissures. Flowers pale yellowish white; December–January.—Abundant in lower Huallaga in flood-free forest, where it appears to attain its best development, also in secondary growth around Tarapoto (alt. 400–1,500 ft.). Wood is employed for rafters and beams in house construction.

Wood pale yellow or light brown, in some specimens reddish brown; straight- or roey-grained; fine-textured; moderately heavy to heavy; saws slightly woolly, takes a smooth finish with a high golden luster; appears to be durable.

Loreto: lower Huallaga, *4579, 4741*.—San Martín: Tarapoto, *6078, 6116, 6612*.

Casearia reginae Macbr., ined.

Forest tree of the lowland, up to 85 feet tall. Crown spreading. Trunk straight, round, 12 to 20 inches in diameter, and free of limbs

for 60 feet. Bark moderately thin, light to dark grayish brown or almost black. Flowers small, pale yellow; May–June.—Fairly abundant; in dry patches in dense forest (alt. 400 ft.).

Wood not clearly defined into sap and heart, pale or pinkish brown.

Loreto: La Victoria, *2758*.

Casearia sylvestris Sw. Fl. Ind. Occ. 2: 752. 1800.

Shrub or small, slender tree, from 15 to 18, infrequently up to 27, feet tall. Crown spreading. Trunk straight, round, and free of limbs up to half the height. Bark yellowish or dark reddish brown. Flowers grayish brown. Fruit small, rounded, and dark brown when mature.—Common in forest and secondary growth in the lower Huallaga and around Tarapoto (alt. 400–1,400 ft.).

Sapwood yellowish to pale brown with grayish tinge; heartwood dark chocolate brown and susceptible to insect attacks.

Loreto: Yurimaguas, lower Huallaga, *4750*.—San Martín: Tarapoto, *6823*.

Casearia sylvestris var. **martinensis** Macbr., ined.

Small tree or tall shrub, from 15 to 27 feet in height. Crown spreading. Trunk straight or fairly so, round, slender, and unbranched for from 3 to 6 feet. Bark grayish brown. Fruit dark brown when mature; June–July.—Common; in dry medium loam on edge of forest (alt. 400–1,400 ft.). Timber is liable to be damaged by insects and is little used except for kindling.

Loreto: Caballo-cocha, *2436*(?).—San Martín: Rumisapa, near Tarapoto, *6831*.

Casearia tarapotina Pilger, Verh. Bot. Ver. Brandenb. 47: 161. 1905. *Tambor huactana.*

Tall shrub or small tree, from 10 to 18 feet in height. Crown open. Trunk straight or fairly so, round, slender, and unbranched for from 2 to 6 feet. Bark light tan, often with slaty gray patches. Fruit small, round; December–January.—Common on the plain of Tarapoto (alt. 1,500 ft.); in sandy loam often along edge of paths in open forest.

Wood almost white when fresh, in dried material becoming creamy yellow, occasionally with light gray streaks or areas caused by stain; straight- or interwoven-grained; moderately fine-textured; of medium weight; inclined to be coarsely fibrous, easy to work, and

takes a smooth finish. Growth rings present owing to light-colored bands resembling parenchyma. Pores not numerous and well scattered; solitary or in radial rows or multiples of 2. Rays closely spaced, lighter than background; visible only with lens on cross section and occasionally on radial.

San Martín: Tarapoto, *6096, 6590, 6723.*

Casearia timbuchi Macbr., ined. *Uchu-caspi.*

Shrub, 9 feet tall. Trunk slender and undivided for 4 or 5 feet. Bark light gray or medium brown, with numerous, small, lighter-colored lenticels. Flowers with yellow corolla and deeper yellow filaments; June–July.—Along banks of streams or in alluvial loam in dense forest (alt. 500 ft.).

Sapwood sharply defined, creamy white; heartwood chocolate brown. Wood interwoven-grained; fairly fine-textured. Growth rings present. Pores in radial rows or multiples of 2–3, less frequently solitary. Rays numerous, fine or fairly fine, slightly sinuous, lighter than background, and visible only with lens on cross section.

Loreto: Timbuchi, upper Nanay, *995.*

4. HASSELTIA HBK.

Hasseltia laxiflora (Benth.) Eichl. in Mart. Fl. Bras. 12, pt. 3: 168. 1886. *Okuchi-huasi, Ratón-caspi, Tamamaru.*

Small tree or shrub, up to 15 feet tall. Crown pyramidal or flat. Bark light tan to chocolate brown, fairly smooth or with numerous, small lenticels. Flowers small, pale yellow or white; July–September. Fruit small, round, red when mature.—Common throughout the lowland from the Peruvian-Brazilian border to the lower Huallaga (alt. 380–400 ft.); in dry loam in old clearings and sometimes forming undergrowth in moderately dense forest free from periodical inundations.

Wood uniform creamy yellow with little or no distinction between sapwood and heartwood; odorless and tasteless; straight- or interwoven-grained; fine-textured; light to medium in weight; easy to cut, takes a smooth finish; susceptible to insects, but free from stain. Growth rings absent or poorly defined. Parenchyma indistinct. Pores very small; moderately or very numerous and well distributed or inclined in some specimens to be crowded; solitary or in radial multiples of 2–4; open or occasionally filled with white deposit of calcium. Vessel lines fine and of same color as background.

Rays moderately fine, lighter than adjacent elements, and visible without lens on cross section; indistinct or barely discernible with lens on other surfaces. Crystals of calcium oxalate abundant in ray cells on radial surface.

Vessels with simple perforations; intervascular pits fairly large and numerous. Rays heterogeneous; 2–3 cells wide. Fibers with small, simple pits; septate.

Loreto: lower Nanay, *588;* La Victoria, *2845, 2937;* Puerto Arturo, lower Huallaga, *4976, 5196.*

5. LAETIA Loefl.

Laetia suaveolens Benth. Journ. Linn. Soc. 5, Suppl. 2: 85. 1861. *Timarehua.*

Tree, 35 feet tall. Crown conical. Trunk straight, round, 7 inches in diameter, and unbranched up to 18 feet. Bark medium brown, rough, and furnishes a fair quantity of viscid, insipid, brown resin. Flowers with filiform filaments. Fruit baccate, trivalvate, pinkish yellow; February–April.—Uncommon; in humid loam near bank of Amazon River (alt. 400 ft.).

Wood creamy yellow or pale brown and streaked; odorless and tasteless; fairly straight- or roey-grained; medium-textured; of medium weight; easy to work, takes a smooth finish, holds its color and place well; fairly durable. Growth rings present owing to difference in depth of color. Pores of small or medium size; fairly numerous, evenly scattered; solitary or in radial multiples of 2, seldom more. Vessel lines numerous, fine, and barely at limit of vision; lustrous tyloses frequently present. Rays numerous, moderately fine, lighter than adjacent elements, evenly spaced, and at limit of vision on cross section; barely distinguishable with lens on other surfaces; dull brown specks of gum abundant in cells.

Vessels with simple perforations. Rays heterogeneous; uni- or biseriate. Crystals of calcium oxalate abundant in ray cells, especially on radial surface. Wood fibers with small simple pits; septate.

Loreto: Iquitos, *8035.*

6. LINDACKERIA C. Presl

Lindackeria maynensis Poepp. & Endl. Nov. Gen. & Sp. 3: 63. *pl. 270.* 1845. *Huacapu, Lluicho-caspi, Quinilla colorada.*

Tree, from 20 to 45 feet in height, although said to attain greater stature. Crown spreading. Trunk erect, columnar, slender, and un-

branched for from 3 to 10 feet. Bark in young trees pale brown, in old trees turning to reddish or chocolate brown, scaly; inner bark darker brown. Flowers with white petals and yellow anthers; June. Fruit round, spiny, edible; October.—Fairly common in the lowland (alt. 400–600 ft.); usually along margin of forest free from seasonal inundations. The strong durable wood is esteemed for house posts.

Sapwood pale brown, in some specimens with dark areas or grayish cast; heartwood well defined, dark gray. Wood has no distinctive odor or taste; straight-grained; fine- and uniform-textured; heavy and compact; moderately easy to cut, takes a smooth, lustrous finish, and holds its place well when finished. Growth rings indistinct or absent. Parenchyma in numerous, very fine tangential lines extending between the rays and barely visible with lens. Pores minute or small; fairly numerous or numerous and well distributed; solitary or in radial multiples of 2–3; mostly open or infrequently filled with calcium. Vessel lines fine, short, and slightly darker than the surrounding elements; pale grayish calcium deposit frequently present. Rays barely at limit of vision on moistened cross section; indistinct on tangential; indistinct or indistinguishable without lens on moistened radial surface.

Vessels with simple perforations. Rays heterogeneous; 3–4 cells wide. Fibers with small, simple pits; often septate.

Loreto: lower Nanay, *425;* near Iquitos, *3731*, *3753;* Yurimaguas, *4681*, *4705;* Punchana, near Iquitos, *8005*.

7. LUNANIA Hook.

Lunania cuspidata Warb. in Engl. & Prantl, Nat. Pflanzenfam. 3, pt. 6a: 47. 1893. *Charapa huatana, Pina-quiro.*

Tree, from 20 to 45 feet tall. Crown infrequently almost round, spreading. Trunk straight, cylindrical, slender, and undivided for 6 to 25 feet. Bark thin, pale grayish brown; inner bark chocolate brown. Flowers in terminal racemes, small, white; June–July. Fruit round, bluish black when mature; October–November.—In dry loam in open patches or in dense forest (alt. 380–600 ft.). Wood is used mostly for fuel.

Sapwood pale yellow or light grayish brown; heartwood thin, dark brown, and with a grayish cast. Wood odorless and tasteless; straight- or interlocked-grained; moderately fine- or medium-textured; of medium weight and compact; easy to cut, splits readily, saws woolly, and is capable of taking a smooth finish; liable to check in drying. Growth rings occasionally present. Parenchyma

indistinct; diffuse or in very fine lines between rays. Pores small or medium-sized; fairly numerous or numerous, well distributed; solitary or in radial multiples of 2–4; open or filled with lustrous tyloses. Vessel lines fine, of same color as adjacent elements. Rays either fine and discernible only with lens on cross and tangential surfaces or fairly broad on cross section; occasionally at limit of vision on radial surface.

Vessels with simple perforations; intervascular pits fairly large, with round borders; vessel-ray pits simple. Rays distinctly heterogeneous; mostly biseriate. Fibers with simple pits.

Loreto: Pebas, *1895;* lower Huallaga, *4731, 5099, 5156.*

8. MAYNA Aubl.

Mayna echinata Spruce ex Benth. Journ. Linn. Soc. 5, Suppl. 2: 82. 1861. *Congo-caspi.*

Tall shrub or small tree, from 15 to 25 feet in height. Crown spreading. Trunk straight, round, 3 to 6 inches in diameter, and clear of limbs up to about half the entire height. Bark thin and dark pinkish brown. Flowers pale yellow or white. Fruit deep yellow when mature; December–January.—Very common in the lower Huallaga and on the plain of Tarapoto (alt. 500–1,500 ft.); in old clearings or along margin of forest; the species was collected also by Spruce in the Brazilian Amazon.

Wood yellowish brown with broad pinkish or grayish streaks; has no distinctive taste or odor; straight- or irregular-grained; fine- or medium-textured; light or medium in weight, but strong and rather tenacious; fairly easy to cut; liable to check in drying; susceptible to stain and insect attacks. Growth rings present on account of some variation in depth of color. Parenchyma indistinct. Pores minute or small and barely visible with lens; rather numerous or very numerous, well scattered; solitary or in small radial multiples or rows. Vessel lines not distinguishable. Rays apparently of two sizes, the larger moderately broad and readily discernible without lens on cross section; indistinct on tangential; of lighter color than background on radial surface.

Vessels with simple perforations; intervascular pits fairly large and with ovoid margins. Rays heterogeneous; multiseriate (2–5 cells wide).

Loreto: lower Itaya, *235;* Sapote-yaco, *4892,* and Puerto Arturo, lower Huallaga, *5021, 5328.*

9. PATRISIA L. C. Rich.

Patrisia pyrifera L. C. Rich. Acta Soc. Hist. Nat. Par. 1: 110. 1792. *Ryania pyrifera* (L. C. Rich.) Uittien & Sleumer in Pulle, Flora of Surinam 3: 286. 1935.

Shrub, 7 to 15 feet tall, with slender, pendent branches. Bark pale green to dark purplish brown, fairly smooth. Leaves oblong, short-stalked, rounded or subrounded at base, abruptly acuminate at the broad tip. Flowers nearly sessile, in the leaf-axils; sepals greenish white, turning pink; filaments white; anthers brown. Fruit soft when mature and valvately dehiscent; valves with thin endocarp, and a thick corky exocarp; seeds brown and finely haired; March–April.—Not common; among shrubs and low trees of second growth (alt. 400–450 ft.).

Sapwood pale yellow or light brown with darker brown markings of rays; heartwood brown, thin. Wood odorless, but has a slightly astringent taste; wavy- or interlocked-grained; fairly fine- or medium-textured; fairly light in weight, but firm, tough, and coarse; easy to cut. Growth rings absent. Parenchyma indistinct; in very few tangential lines extending between the rays. Pores minute or small; fairly numerous, well scattered; solitary, less frequently in small radial rows or multiples. Vessel lines fine and indistinct without lens. Rays yellowish white or pale brown, apparently of two sizes, the larger ones conspicuous on cross section; darker than the surrounding elements and readily distinguishable on other surfaces.

Rays distinctly heterogeneous, cells filled with an abundant deposit of dark brown gum; up to 14 cells or more wide.

Loreto: upper Itaya, *3443;* near Iquitos, *8229.*

10. PROCKIA L.

Prockia septemnervia Spreng. Syst. Veg. 2: 609. 1825. *Charapilla.*

Medium-sized or fairly tall tree, often attaining a height of 60 feet. Crown almost round. Trunk straight, round, from 15 to 24 inches in diameter, unbranched up to 45 feet, and with four buttresses about 3 feet high. Bark 0.5 to 1 inch thick, brown, rough; inner bark pinkish brown. Fruit green and soft when mature; October–November.—Uncommon; in dense forest clear of inundations (alt. 500 ft.). Wood is used for fuel only.

Sapwood pale yellow with pinkish, light brown, or dark purplish streaks; heartwood reddish to dark brown or almost black. Wood odorless and tasteless; straight-grained; medium-textured; of medium

weight or fairly heavy; not difficult to work, takes a fairly smooth polish with a moderate luster; likely to check in drying and subject to stain. Growth rings indistinct. Parenchyma paratracheal, confluent, also in broken or fairly continuous concentric lines or bands. Pores fairly small or medium-sized; few, well scattered; solitary or in radial multiples of 2–5, seldom in tangential pairs or in small clusters; mostly open. Vessel lines appear as fine scratches of slightly darker color than background; white deposit or dark brown gum frequently present. Rays numerous, very fine, evenly spaced, wavy, and lighter than background on cross section; barely visible with lens on tangential and radial surfaces.

Vessels with simple perforations; intervascular pits small, numerous, and with round margins. Rays heterogeneous, crystals of calcium oxalate common in cells; 3–4 cells wide.

Loreto: lower Huallaga, *5048;* herbarium material collected also near Tarapoto, San Martín.

11. TETRATHYLACIUM Poepp. & Endl.

Tetrathylacium macrophyllum Poepp. & Endl. Nov. Gen. & Sp. 3: 34. *pl. 240.* 1845. *Anonilla, Llaja, Mulla-huayo.*

Small tree, seldom exceeding 20 feet in height. Crown spreading. Trunk bent or fairly straight, round, 4 to 8 inches in diameter, and unbranched up to 7 feet. Bark pinkish or grayish brown and fairly smooth; wood beneath bark often deep pink. Leaves up to 12 inches long, leathery, and alternate. Inflorescence cymose-axillary; flowers small, yellow; October. Fruit a berry.—Widely distributed in the lowland, but nowhere common; in old clearings and thickets (alt. 380–500 ft.).

Wood creamy yellow or pale pinkish brown with light gray streaks; has no distinctive odor or taste; straight-grained; fine- to medium-textured; light or moderately light in weight; easy to cut, takes a smooth finish; does not appear to be durable. Growth rings present. Parenchyma indistinct; in very fine tangential lines extending between the rays. Pores small; fairly numerous to very numerous, well scattered; in radial multiples of 2–4, less often solitary, in diagonal or tangential pairs, seldom in small clusters; variation appearing in different specimens; mostly open. Vessel lines fine, of same color as background, and indistinct to unaided eye. Rays fairly fine, evenly spaced, and discernible with lens on cross section; indistinct on tangential; dark or reddish brown and at limit of vision on radial surface. Pith pale brown, septate, thin.

Vessels with scalariform perforations; intervascular pits fairly large and with ovoid or round margins; vessel-ray pits half-bordered or bordered. Rays heterogeneous; 3–4 cells wide.

Loreto: Caballo-cocha, *2136;* La Victoria, *2713;* near Yurimaguas, *4010*(?), *4618.*

12. XYLOSMA Forst. f.

Shrubs or small trees, the trunk often armed with large, branched spines. Leaves short-stalked, crenate or almost entire. Flowers minute, fascicled in the leaf axils or in short racemes; petals absent; stamens numerous. Fruit a small, 2–8-seeded berry.

Wood light brown, darkening slightly on exposure and usually with a grayish cast; moderately fine- or medium-textured; of medium weight or fairly heavy; easy to work and takes a fairly smooth polish; durable. Parenchyma sparsely developed; indistinct or visible as fine lines extending between the rays. Pores of medium size; numerous, diffuse; solitary or in multiples; open or infrequently filled with tyloses. Rays fine, wavy, numerous, and closely spaced on cross section; indistinct on tangential; sometimes barely visible on radial when held to proper light.

Vessels with simple perforations; intervascular pits with slit-like orifices. Rays heterogeneous; 1–4 cells wide.

Xylosma pilosa Macbr. Candollea 5: 391. 1934. *Diablo-casha, Supai-caspi.*

Tall shrub or small tree, approximately 15 feet tall. Crown open. Trunk straight, round, slender, and undivided for 5 feet. Bark light green to rufous brown, with small lenticels.—Rare; in dry loam along margin of forest (alt. 500 ft.).

Wood pale yellow or deep pinkish brown and darkening in color on exposure to air; straight-, roey-, or interwoven-grained; medium-textured; of medium weight, tenacious, and compact; inclined to be fibrous and splintery; easy to work, takes a smooth polish; checks in drying. Growth rings present owing to variation in abundance of pores. Pores of medium size; rather numerous, well distributed; solitary or in radial multiples of 2–3; mostly open. Vessel lines of same color as background and indistinct; grayish white deposit sometimes present and discernible with lens. Rays very fine, numerous, closely spaced; discernible only with lens on cross and radial surfaces; indistinct on tangential.

Loreto: Puerto Arturo, lower Huallaga, *4977.*

Xylosma Salzmannii Eichl.(?), in Mart. Fl. Bras. 13, pt. 1: 448. 1871. *Cunshi-cashan.*

Slender shrub, 14 feet tall. Crown open. Trunk and branches contorted and armed with stout spines up to 1.5 inches long. Bark medium brown with a pale gray cast.—Uncommon; in dry loam in clearings or along edge of path in forest (alt. 500–3,500 ft.).

Wood uniform light brown, occasionally with pale grayish white areas; straight- or irregular-grained; fairly light in weight, but firm; easy to cut, takes a smooth finish; fairly durable. Growth rings poorly defined. Parenchyma indistinct. Pores in radial multiples of 2–3 and less frequently solitary; open. Vessel lines indistinct. Rays numerous, very closely spaced, slightly wavy, and visible only with lens on cross section; darker than background and discernible without lens on radial surface.

Loreto: near Yurimaguas, *4487;* herbarium material collected also at San Roque, San Martín.

CARICACEAE. Pawpaw Family

Trees or large shrubs, rarely herbs, with milky juice. Leaves alternate, long-stalked, simple, and deeply lobate or digitately compound, without stipules. Flowers commonly unisexual. Fruit baccate, large, 1- or 5-celled. Wood spongy and perishable.

1. CARICA L.

Carica Papaya L. Sp. Pl. 1036. 1753. *Papayo.*

A rapid-growing tree, from 15 to 30 feet in height, planted abundantly and in places naturalized. Crown flat, with few branches. Trunk straight, columnar, up to 10 inches in diameter. Bark thin, spongy within, and papery outside. Leaves toothed, deeply lobed, and simple. Fruit oblong or obovoid, yellow or orange, with thick skin, firm pulp with a delicious flavor, and is one of the most esteemed fruits of tropical America; seeds numerous, black, and rough. All parts of the tree contain a copious milky juice.

Wood very spongy and consists of an outer ring of fibrous wood bundles surrounding a large pith. The bundles are wedge-shaped and crossed at intervals by bars in which the small pores are located. The medullary rays between the bundles are indistinct.

Loreto: Caballo-cocha, *2181;* La Victoria, *2837, 3023*—herbarium material only.

2. JACARATIA Endl.

Jacaratia digitata (Poepp. & Endl.) Solms in Mart. Fl. Bras. 13, pt. 3: 191. *pl. 51, fig. 1.* 1889. *Shamburu.*

Medium-sized or tall tree, at times attaining a height of 75 feet. Crown conical or spreading; branches arranged in whorls and often spinose. Trunk straight, columnar, about 19 inches in diameter, and free of branches for more than one-fourth the height. Bark brown or almost black and exudes an astringent juice. Leaves long-stalked, digitate; leaflets broadly round-ovate. Fruit oblong; maturing in February.—Limited in its distribution; in old clearings or along margin of forest (alt. 450 ft.).

Loreto: upper Itaya, *3342*—herbarium material only.

THYMELAEACEAE. Leatherwood Family

1. SCHOENOBIBLUS Mart.

Schoenobiblus peruvianus Standl. Field Mus. Bot. 11: 169. 1936. *Barbasco-caspi.*

Small tree, up to 25 feet in height. Crown irregular. Trunk slender and unbranched for 5 feet. Bark dark chocolate brown; inner bark grayish or dirty white and woolly. Flowers white; June–July.—Uncommon; in dense forest, often near streams (alt. 450 ft.).

Wood creamy yellow when freshly cut, but soon turns to pale pinkish brown on exposure, occasionally with canary yellow streaks and a grayish cast; has a pleasant odor and a slightly bitter taste when fresh; straight-grained; fairly fine- or medium-textured; moderately light in weight, but firm and strong; easy to cut and takes a smooth finish; checks in drying; fairly durable. Growth rings indicated by terminal parenchyma. Parenchyma paratracheal, aliform, sometimes in broken, concentric lines or fine bands, at times uniting the pores or indicating limit of growth rings. Pores of medium size; fairly numerous and well scattered; solitary, less often in radial multiples of 2–4 or in fairly small clusters. Vessel lines indistinct or barely at limit of vision. Rays lighter-colored than background, fairly broad, and visible without lens on cross section; lighter than adjacent elements and fairly distinct in proper light on radial surface.

Vessel segments short, stout, and compressed; vessel perforations simple. Rays heterogeneous; uniseriate; dark brown gum common in cells. Wood fibers fairly thin-walled; pits simple or half-bordered.

Loreto: middle Nanay, *1162.*

LYTHRACEAE. Loosestrife Family

Herbs, shrubs, or small slender trees. Leaves opposite, whorled, or alternate, entire, estipulate or with minute stipules. Flowers perfect, 4–16-parted. Fruit capsular, dry. Some of the members are important sources of dyestuffs, for example, the Egyptian henna, *Lawsonia inermis* L., a small shrub with small, very fragrant, greenish flowers, widely cultivated for its leaves, the source of henna dye used for imparting an orange-yellow or brownish-yellow color to nails, hair, skin, and leather. "Locura" (*Lagerstroemia indica* L.), a native of the East Indies and Australia, is much esteemed locally for ornament. The Peruvian species do not yield timber of commercial importance.

Sapwood whitish or pale yellow to grayish, pinkish, or purplish brown; heartwood sometimes well defined, light to dark chocolate brown. Wood usually without odor or taste; fine- or medium-textured; mostly of medium weight to heavy; sometimes saws woolly, easy to work, and takes a moderately or highly lustrous polish; fairly durable or durable. Parenchyma paratracheal, aliform, or in broken, tangential bands often uniting the pores, sometimes terminal; indistinct or visible only with lens. Pores of small or medium size; numerous or fairly numerous, diffuse- or ring-porous; solitary or in multiples, seldom in rows or small clusters. Rays fine or very fine and numerous on cross section; indistinct on tangential; usually fairly conspicuous on radial surface. In *Physocalymma scaberrimum* Pohl large oil or resin canals are present along the margin of the rays, in the wood parenchyma strands, and in the bark, constituting a highly characteristic feature of the species.

Vessels with simple perforations; intervascular pits rather large, slit-like; vessel-ray pits large and elongated; pits vestured. Rays heterogeneous or in some species tending to homogeneous; mostly uniseriate or biseriate. Wood fibers with simple pits; often septate.

1. ADENARIA HBK.

Adenaria floribunda HBK. Nov. Gen. & Sp. 6: 188. *pl. 549.* 1824. *Puca-varilla, Rumo-caspi.*

Slender shrub or small tree, up to 15 feet tall. Leaves, twigs, and bark covered with small, black glands. Crown conical or flat. Bark thin, reddish brown. Leaves opposite, short-stalked or almost sessile, narrowly oblongate or elliptic-lanceolate, acute or acuminate, puberulent beneath. Flowers in short, dense, axillary cymes; petals yellowish white; June–July. Fruit small, deep pink or reddish brown,

and borne in clusters; December–January.—In dense forest (alt. up to 1,800 ft.); reported also between Huánuco and Pampayaco, Piedra Grande (alt. 5,000 ft.), Ccarrupa, between Huanta and Río Apurímac (alt. 4,500 ft.), and near the estuary of the Zubineta, an affluent of the Putumayo.

Sapwood lustrous light brown; heartwood pale or dark chocolate brown. Wood has no distinctive taste or odor; straight-grained; uniformly fine- or medium-textured; rather heavy, firm, and compact; easy to work and finishes smoothly. Growth rings present and distinct owing to variation in depth of color. Parenchyma abundantly developed; paratracheal. Pores small; numerous, scattered; solitary or in radial multiples of 2–3, rarely more, seldom in small radial rows; open or filled with calcium. Vessel lines appear as fine, shallow scratches. Rays barely visible with lens on cross section; indistinct on tangential; of same color as background, but fairly distinct, on radial surface.

Loreto: Pebas, *1855*, *1931*.—San Martín: Lamas, *6354*, *6440*, *6838*.

2. PHYSOCALYMMA Pohl

Physocalymma scaberrimum Pohl, Flora 10: 153. 1827.

Slender tree, up to 32 feet in height. Crown spreading. Trunk erect, columnar, about 7 inches in diameter, and unbranched for 14 feet. Bark 0.25 inch thick, pinkish brown, scaly; inner bark with distinct pale yellow deposit (see notes on minute structure). Leaves obovate, acuminate, petiolate. Flowers with dark purple calyx and bright pink corolla.—Fairly common in the lower Huallaga and plain of Tarapoto (alt. 550–1,500 ft.); in old clearings or along margin of flood-free forest; reported also from the Colonia Perene (alt. 2,100 ft.), in the Chanchamayo Valley (alt. 3,700 ft.), near La Merced (alt. 2,000 ft.), and in the forests of western Brazil near the Peruvian border. Timber is used for fuel only.

Sapwood yellowish or pinkish brown with a grayish tinge; heartwood purplish or dark brown, well defined, perishable. Wood has no distinctive odor or taste; moderately straight-grained; medium-textured; of medium weight to heavy, moderately hard, and compares with maple (*Acer*); moderately easy to work and capable of taking a smooth, lustrous polish; subject to insect attacks, but durable. Growth rings absent or present owing to slight variation in the density of the wood. Parenchyma meta-

tracheal; in broad, irregular, broken, tangential or oblique bands; readily visible without lens in some specimens. Pores of small or medium size; not numerous to numerous and well scattered; solitary or in radial multiples of 2–3; sometimes filled with tyloses or calcium. Vessel lines fine, but distinguishable without lens; grayish white or white deposit often discernible to aided eye on tangential section. Rays very fine and numerous on cross section; faintly discernible on tangential; slightly darker than the surrounding elements on radial surface and occasionally visible to unaided eye.

Vessels with simple perforations; intervascular pits rather large, with slit-like apertures; vessel-ray pits large and elongated, often in scalariform arrangement, simple or, at times, tending to bordered. Rays heterogeneous; 1–3 cells wide and few to 25 cells high. Wood fibers with minute simple pits; often septate. A characteristic feature of this species is the presence of large oil or resin canals located at intervals along the margin of the rays, in the wood parenchyma strands, and in the bark; they are thin-walled and have yellowish contents.

Loreto: near Yurimaguas, *3882*, *4025*.—San Martín: near Tarapoto, *5601*.

LECYTHIDACEAE. Brazil-nut Family

Small to large trees, widely distributed in tropical regions of both hemispheres, but most abundant and of greatest stature in the Amazon Valley. Leaves simple, alternate, without stipules. Flowers rather large and showy, in terminal racemes or panicles, actinomorphic or zygomorphic, hermaphrodite; stamens numerous, in several series. Fruit woody, fibrous, or fleshy, indehiscent or operculate at the apex. While many of the timbers are suitable for construction and carpentry, and have considerable local utility, they are practically unknown to commerce.

Sapwood ranges in color from pale grayish or drab to light brown; heartwood brown, with variations in shade from yellow or olive through pink, reddish, to chocolate or purplish. Woods at times, e.g., *Gustavia*, have a fetid or nauseous odor in fresh material; mostly straight-grained; fine- to very coarse-textured; some are comparatively light and soft, while others are extremely hard and heavy. Growth rings distinct, poorly defined, or absent; sometimes indicated by variation in the spacing of the parenchyma and the relative abundance of the pores. Wood parenchyma abundantly developed; mostly in definite metatracheal bands or lines, which

vary from fine and indistinct to as wide as the fiber layers between them, sometimes paratracheal. Pores mostly small and indistinct to rather large and distinct; moderately numerous to very numerous; chiefly in radial multiples of 2–3, sometimes in irregular clusters or solitary. Rays indiscernible with lens to broad on cross section and producing a conspicuous silver grain on radial. Vertical gum ducts, gummosis type, sometimes present.

Vessels with mostly short to long members; thin-walled tyloses common; perforation plates exclusively simple; intervascular pit-pairs medium-sized, alternate or opposite, and with lenticular or slit-like apertures; vessel-ray pits of two sizes: (*a*) large and usually elongated; (*b*) small and resembling intervascular, alternate or occasionally crowded. Wood fibers thick-walled and with small, simple or indistinctly bordered pits. Rays homogeneous or nearly so; 2–7, sometimes 15, cells wide, and few to 60–100 cells high; crystals of calcium oxalate or dark yellow or reddish brown gum common, sometimes very abundant.

1. GRIAS L.

Grias Neuberthii Macbr. Field Mus. Bot. 11: 30. 1931. *Chope.*

Tree, 55 feet high. Crown spreading. Trunk fairly straight, round, 19 inches in diameter, and branching 3 or 4 feet from base. Bark pale brown with grayish white patches; inner bark very fibrous. Leaves sessile, oblong-spatulate, short-acuminate, angustate at base. Flowers pale yellow, showy, long-stalked, and borne on the trunk; June–July. Fruit ovoid, brown when mature, and contains a white, succulent pulp.—Sometimes cultivated.

Wood pale cream-colored when fresh, light brown when dried, often stained dark gray or almost black; slightly bitter to taste; straight- or wavy-grained; medium-textured; of medium weight; easy to work and takes a fairly smooth polish; checks in drying. Parenchyma visible with lens as numerous, wavy, closely spaced lines extending between the rays. Pores of medium size; numerous and uniformly scattered; in radial or diagonal multiples of 2 or more, also in small clusters, less frequently solitary; open. Vessel lines fine and faintly visible without lens in proper light. Rays lighter-colored than the surrounding elements and fairly broad on cross section; fairly distinct on tangential; of a grayish white color and rather prominent in proper light on radial surface.

Loreto: Caballo-cocha, *2337*.

2. GUSTAVIA L.

Small or occasionally medium-sized trees. Leaves alternate, vary in length from a few inches to almost 3 feet, and are mostly in clusters near the tips of the branches. Flowers white or yellowish and showy. Fruit globular, about the size of an apple, and with a leathery pericarp; pulp sometimes edible; seeds numerous, bean-like. The flowers and the fleshy fruit are clustered along the trunk and larger branches. Often planted for their fruit, but the timber is not used locally.

Wood varies from creamy yellow to pale brown, at times with a grayish tinge; generally characterized by a fetid odor that is pronounced in fresh material; moderately fine-textured; heavy and hard to moderately so, tough, and strong; easy to work and takes a good polish; durable. Parenchyma in numerous, very fine, wavy, closely spaced lines, one cell wide, and extending from ray to ray. Pores fairly small; numerous, diffuse- or tending to ring-porous; solitary or in radial multiples or rows; open. Rays broad and conspicuous on cross section; visible without lens, but not very distinct, on tangential and radial surfaces.

Vessel perforations simple; intervascular pits small, numerous, with slit-like orifices. Rays homogeneous, tending to heterogeneous; 1–5 cells wide and up to 50 cells or more high; crystals of calcium oxalate common.

Gustavia caballoensis Macbr. Field Mus. Bot. 11: 28. 1931. *Chope.*

Tree, from 12 to 27 feet tall. Crown spreading. Trunk branching from the base or straight, round, slender, and unbranched up to three-fourths the height. Bark purplish or chocolate brown, with few, fairly large lenticels; inner bark deep pink. Flowers large, white, and showy; July–August. Fruit large, rounded, and operculate.—Common in the vicinity of the Peruvian-Brazilian border (alt. 380 ft.); in dry loam in second growth.

Wood creamy yellow, with little or no distinction between sap and heart; has a strongly fetid odor when fresh; moderately straight- or interwoven-grained; medium-textured; of medium weight; easy to cut and capable of taking a smooth, dull finish; liable to check in drying. Growth rings present, but not well defined. Parenchyma in very closely spaced, wavy lines extending tangentially between the rays. Pores small; numerous and well scattered or tending to ring-porous; solitary, in small radial multiples or rows, or in small

clusters; open. Vessel lines fine, of same color as background, and indistinct. Rays lighter-colored than adjacent elements and very distinct on cross section; sometimes discernible without lens, though not distinct, on tangential and radial surfaces.

Loreto: Caballo-cocha, *2152*, *2236*, *2240*.

Other numbers determined provisionally:

Loreto: Caballo-cocha, *2414*, *2430*, *2502;* La Victoria, *3165;* upper Itaya, *3406;* Iquitos, *8057*.—San Martín: Tarapoto, *5646*.

3. LECYTHIS Loefl.

Lecythis sp.(?) *Machinmangua*. Tree, up to 75 feet in height. Crown spreading. Trunk straight, round, 30 inches in diameter, and unbranched for 45 or 50 feet. Bark purplish to pale brown; inner bark fibrous and employed locally for cordage. Fruit subround and operculate; June–July.—In flood-free forest or in alluvial loam, often near streams (alt. 450 ft.).

Sapwood creamy yellow, darkening slightly on exposure, with fine, dark gum striping and bluish gray streaks; heartwood dark brown, perishable. Wood has a slightly bitter taste; straight-grained; medium- to rather coarse-textured; of medium weight to fairly heavy, compact; saws slightly woolly; does not appear to be durable. Parenchyma in numerous, unevenly spaced, concentric bands of same color as, and forming a network with, the rays. Pores of medium size; not numerous, well scattered; solitary; mostly filled with white or pale brown deposit. Vessel lines not distinct. Rays numerous and readily visible with lens on cross section; distinguishable also to aided eye on other surfaces; small specks of dark brown common in ray cells.

Loreto: Timbuchi, upper Nanay, *979*.

COMBRETACEAE. Combretum Family

Shrubs or trees, sometimes climbing. Leaves opposite or alternate, entire, without stipules. Flowers arranged in heads, spikes, or racemes; calyx 4–5-lobed; petals 4–5 or absent. Fruit dry or drupaceous, indehiscent, 1-celled, and 1-seeded. The members of this family furnish bark, leaves, and fruits used extensively in the tanning and dyeing industries and to some extent also for medicinal purposes.

1. TERMINALIA L.

Medium-sized or large trees. Leaves alternate, often crowded at the tips of the branches. Flowers small, greenish, in long slender

spikes; petals absent; stamens 8–10. Drupe flattened, with acute edges, sometimes with 2–5 wings. The timber is only of local importance, although it has good qualities for railway ties, furniture, and general construction. *T. Catappa* L., commonly known as "almendro" or "castaña" and a native of the East Indies, is planted in the lowland, as in other regions of tropical America, for shade and decorative purposes.

Sapwood yellowish, pinkish, or pale brown; heartwood darker brown, at times with a satiny luster. Wood medium- or coarse-textured; light, soft, and splintery to heavy; takes a fairly smooth polish; often durable. Parenchyma paratracheal, sometimes confluent, also in broken, irregularly spaced, tangential or concentric lines, which are distinct at times, and appear to indicate limit of growth rings. Pores of medium size to large; fairly numerous, diffuse- or tending to ring-porous; solitary or in multiples; open or filled with deposit of calcium. Rays fine or very fine; fairly distinct on radial surface, at times producing a fine silver grain. Vertical ducts, gummosis type, have been observed in some species.

Woods of this group suggest the Leguminosae in the arrangement of the parenchyma, the exclusively simple perforations of the vessels, and the sieve-like perforations of the pit membranes, but in general they are quite distinct. Rays heterogeneous; uniseriate.

Terminalia oblonga Steud. Nom. ed. 2. 2: 668. 1841. *Rifari.*

Forest tree, from 30 to 50 feet in height. Crown spreading or flat. Trunk straight, columnar, up to 20 inches in diameter, and unbranched for about half the entire height. Bark light gray, pink, or reddish brown, fairly smooth or covered with numerous, small, short ridges, and yields when cut a resin used for dyeing cloth. Leaves oblongate. Flowers in dense spikes. Fruit a two-winged drupe; September–October.—Not common; in open dry loam in thickets and on hill slopes (alt. 400–500 ft.). The dense wood is used for posts in the construction of huts.

Sapwood distinctly demarcated, greenish yellow or pinkish brown; heartwood chocolate brown, thin. Wood has no distinctive odor or taste; not easy to work and takes a fairly lustrous finish; checks in drying; durable. Growth rings present or poorly defined; visible owing to variation in abundance of elements. Parenchyma paratracheal and in irregular, broken, tangential or diagonal bands. Pores fairly small or visible to unaided eye; not very numerous and well scattered; solitary, in radial multiples of 2–3, or in small clusters; open. Vessel lines long and rather coarse; often filled with grayish

white deposit. Rays numerous and visible only with lens on moistened cross section; faintly discernible to aided eye on other surfaces.

Loreto: lower Nanay, *596;* lower Huallaga, *3968.*

MYRTACEAE. Myrtle Family

The Peruvian species are shrubs or small trees, although a species of *Eucalyptus,* common around Chachapoyas and doubtless introduced, attains a height of up to 80 feet. Leaves simple, opposite, entire, without stipules, and conspicuously dotted with oil glands; when crushed they frequently have an aromatic odor. Flowers mostly small, perfect, regular, and variously arranged; calyx 4–5-lobed; petals 4 or 5; stamens numerous. Fruit a 1-seeded drupe or many-seeded berry, and in many instances edible. In general, the members of this group are characterized by an abundance of aromatic volatile or essential oil used in perfumery, while some plants have attractive flowers and are used for decorative purposes. From the standpoint of commercial value the most important genus is *Eucalyptus,* which constitutes the bulk of Australian forests.

Sapwood variable in color from white to pale pink or light brown, often with purplish streaks; heartwood medium or pale brown to dark purplish or almost black and fairly lustrous. Wood odorless and tasteless; fairly fine- to medium-textured; of medium density to rather heavy; sometimes splintery or brittle, not difficult to work, and takes a smooth polish; durable or moderately durable. Parenchyma paratracheal, sometimes confluent, or in numerous, exceedingly fine lines extending between the rays; sometimes indistinct. Pores of small to medium size; fairly numerous to numerous, arranged in zigzag arrangement as in *Eucalyptus* or scattered without definite order as in *Psidium;* solitary, in multiples or rows, less often in clusters; open or closed. Rays fine or very fine on cross section, numerous and closely spaced in *Eucalyptus;* invisible to unaided eye on other surfaces; calcium deposit common in *Psidium.* Vertical canals, gummosis type, are present in *Eucalyptus* and sometimes in *Psidium*(?).

Vessels have simple perforations; vessel-parenchyma pits mostly bordered; pits vestured. Rays decidedly heterogeneous; mostly 1–2 cells wide. Wood fibers commonly thick-walled and with inconspicuously bordered pits.

1. PSIDIUM L.

Shrubs or small trees. Flowers often rather large, white or whitish, the peduncles axillary, 1–3-flowered; calyx 4–5-lobed, the

lobes partly or entirely united in bud; petals 4–5. Fruit a globose or pear-shaped berry, commonly 4–5-celled, and edible.—Common in thickets or in open places. Timber is of no local value.

Sapwood pale pink to light brown, often streaked; heartwood ranging from light to dark purplish brown or almost black. Wood odorless and tasteless; fairly fine- to medium-textured; of medium density to rather heavy; often rather splintery or brittle, but not difficult to work, and takes a fairly lustrous polish; usually durable. Parenchyma in numerous, exceedingly fine lines extending between the rays. Pores fairly small to medium-sized; moderately numerous to numerous and well distributed; solitary, in multiples or rows, seldom in small clusters; often filled with white deposit of calcium. Rays very fine or fine on cross section; indistinct on other surfaces. Pith is almost invariably very dark brown in color and rectangular in outline.

Rays heterogeneous; 1–2 cells wide. Crystals of calcium oxalate common in parenchyma strands.

Psidium Guajava L. Sp. Pl. 470. 1753. *Guayaba.*

Small tree, from 20 to 25, seldom up to 40, feet in height. Crown spreading or flat. Trunk often bent, fairly round, 7 inches or more in diameter, and unbranched for about 12 feet. Bark in young trees pale gray or light pinkish brown, in old trees dark purple or chocolate brown and scaly. Twigs tomentose. Leaves short-stalked, oblong, acute or obtuse, in young trees tomentose on upper surface, becoming glabrous with age. Flowers with white petals and filaments. Fruit round, yellow or yellowish pink; one of the favorite fruits of tropical America; it is rather insipid to taste when unripe and is eaten either raw or made into jelly or paste.—Planted commonly and is frequent in thickets. Wood of old trees is sometimes used for fuel.

Sapwood variable in color from pale yellow to pinkish brown with a grayish cast and darker brown streaks; heartwood dark brown, thin. Wood has no distinctive odor or taste; straight- or moderately straight-grained; rather fine-textured; of medium weight, firm, and strong; takes a smooth, rather dull polish; subject to insects. Growth rings absent or indistinct. Parenchyma in numerous, very fine, short lines extending between the rays or in concentric bands. Pores small; fairly numerous and well scattered; solitary or in small radial multiples or rows; open or closed. Vessel lines fine and occasionally distinguishable without lens; white deposit often present.

Rays fairly numerous and visible only with lens on cross section; invisible without lens on tangential and radial surfaces.

Loreto: near Iquitos, *108;* lower Itaya, *187, 271;* lower Nanay, *552;* Pebas, *1587;* Caballo-cocha, *2157;* upper Itaya, *3502;* Yurimaguas, *4002.*—San Martín: Tarapoto, *5534.*

Additional numbers determined provisionally:

Loreto: Pebas, *1849, 1995;* Caballo-cocha, *2276.*

MELASTOMACEAE. Melastome Family

One of the largest and most characteristic groups of tropical American plants, represented by trees, shrubs, or herbs. Leaves simple, opposite or verticillate, entire or toothed, with pubescence often of branched hairs, and (except in *Mouriria*) with 3–9 longitudinal nerves arising at or near the base of the blade and running to the apex. Flowers perfect, small or large and showy, have white, pink, yellow, or purple petals, and twice as many stamens as petals. Fruit a 2–many-celled capsule or berry, and in the latter case sometimes edible. The family is not of economic importance.

Wood ranges in color from yellowish or creamy white to pinkish or dark chocolate brown, sometimes streaked or with a grayish cast, and often with no sharp distinction between sap and heart; mostly without characteristic odor or taste; fairly fine- to medium-textured; slightly fibrous or splintery, easy to work; durable or moderately durable. Parenchyma sparingly to abundantly developed; paratracheal or metatracheal. Pores small to medium-sized; fairly numerous to numerous and uniformly distributed; most often solitary or in multiples, also in rows or small clusters; open or filled with lustrous tyloses, calcium, or gum deposit. Rays fine or fairly fine, rarely broad, as in *Leandra*, numerous, and wavy on cross section; invisible on tangential; occasionally discernible to unaided eye on radial surface.

Vessel perforations simple; the bordered pits of the vessels sometimes possess sieve-like structure, e.g., *Meriania, Ossaea;* vessel-parenchyma pits simple to bordered. Rays heterogeneous; mostly uni- to triseriate.

1. BELLUCIA Neck.

Small or medium-sized trees. Leaves longitudinally 3–9-nerved. Flowers large, white or pink, solitary or in small clusters, lateral or axillary; stamens equal or nearly so. Fruit baccate, large, and edible. Timber is sometimes employed for general construction.

Sapwood yellowish to pale brown, often with a grayish cast; heartwood dark reddish or purplish brown. Wood odorless and tasteless; medium- to rather coarse-textured; of medium density to moderately heavy; inclined to be splintery, takes a lustrous finish; durable. Parenchyma sparingly developed; paratracheal and in numerous, very fine, indistinct lines extending between the rays. Pores of medium size to fairly large; moderately numerous to numerous, well distributed; solitary or in multiples, seldom in clusters; infrequently closed. Rays fairly fine and numerous on cross section and sinuous, especially at point of contact with pores; indistinct on tangential; fairly distinct on radial surface.

Bellucia grossularioides (L.) Triana, Trans. Linn. Soc. 28: 141. 1871; Mart. Fl. Bras. 14, pt. 4: 512. 1888. *Níspero, Níspero del monte.*

Medium-sized tree, attaining a height of up to 55 feet. Crown spreading. Trunk often bent, from 9 to 15 inches in diameter, and free of branches for 3 to 18 feet. Bark 0.5 inch thick, dark brown, and scaly. Leaves subcoriaceous, ovate to elliptic-ovate, sharply acuminate or acute at apex, glabrate. Flowers white. Fruit yellowish when mature, succulent, and edible.—Common in the lowland (alt. 380 ft.); in clearings and sometimes planted for its fruit; widely distributed in tropical America, ranging from Brazil as far north as Panama. Wood is not used locally.

Sapwood pale yellowish to pinkish brown, in some specimens with dark, almost black, streaks; heartwood dark purplish brown. Wood slightly fragrant when freshly cut, but tasteless; straight-grained; medium-textured; heavy or moderately heavy, hard, compact, and strong; fairly easy to cut and takes a smooth, lustrous finish. Growth rings absent or poorly defined. Parenchyma sparingly developed and indistinct; paratracheal and metatracheal. Pores barely at limit of vision; moderately numerous and well scattered; solitary, in small radial multiples, or in small clusters; open. Vessel lines readily distinguishable; often filled with white deposit. Rays invisible without lens on all surfaces.

Loreto: lower Nanay, *643;* Pebas, *1588;* Caballo-cocha, *2073.*

Bellucia Weberbaueri Cogn. Bot. Jahrb. 42: 148. 1908. *Níspero.*

Small or medium-sized tree, often attaining a height of 40 feet. Crown open. Trunk straight or fairly so, slender, cylindrical, and free of branches up to half the height. Bark moderately thick,

yellowish or grayish to dark brown, with thin, papyraceous scales and coarse lenticels. Flowers pink; October–November. Fruit round, edible.—Common in the lower Huallaga region, near Tarapoto, and around Moyobamba (alt. 450–2,700 ft.); in clearings. Timber is used for general carpentry, in the construction of huts, and for fuel.

Sapwood distinctly demarcated, uniformly pale pinkish brown; heartwood dull dark grayish brown. Wood straight-grained; uniformly fine-textured; heavy, strong, and more compact than *B. grossularioides;* takes a smooth, lustrous finish; durable.

Loreto: lower Huallaga *3969*, *4410*(?), *7828*.—San Martín: Tarapoto, *5591*.

2. CALYPTRELLA Naud.

Calyptrella cucullata (Don) Triana, Trans. Linn. Soc. 28: 72. 1871; Mart. Fl. Bras. 14, pt. 4: 44. 1886. *Díspero, Níspero.*

Slender tree, from 10 to 35 feet in height. Crown spreading. Trunk straight, cylindrical, and free of limbs for from one-half to two-thirds the height. Bark 0.5 inch thick, yellowish brown, with low ridges. Heartwood yields a small amount of tasteless, reddish resin. Leaves opposite, ovate or oblong-ovate, subcoriaceous, mostly rounded at base, sharply acuminate at apex. Flowers white, in rather dense panicles. Capsule ovoid, light brown, about 0.25 inch long.—Has a wide distribution in the Andean regions, usually in secondary growth; common in the neighborhood of Tarapoto and at Lamas (alt. 1,400–1,800 ft.), also at San Roque (alt. 3,500 ft.); previously reported at Casupi, Huánuco, and Posuso (alt. 2,000 ft.), from the Chanchamayo Valley, Department of Junín, and by Spruce along the slopes of the Campana, and at Timborazo, near Tarapoto.

Sapwood constitutes most of the wood, uniform pale brown, occasionally with dark streaks, and darkening somewhat on exposure; heartwood dull brown. Wood odorless and tasteless; straight- or roey-grained; medium-textured; of medium weight; easy to cut and takes a lustrous finish; not durable. Growth rings absent or faintly visible in some specimens. Parenchyma sparsely developed; paratracheal and in indistinct, irregularly spaced, concentric bands. Pores discernible to unaided eye; numerous or fairly numerous; most frequently in radial multiples of 2–5, seldom in rows, occasionally solitary and circular in outline; open. Vessel lines short, fine, but readily distinguishable against the lighter-colored background. Rays not discernible without lens on cross and tangential sections; sometimes visible, but not prominent, on radial surface.

San Martín: Lamas, *6459;* San Roque, *7109*.

3. CLIDEMIA D. Don

Clidemia hirta (L.) D. Don, Mem. Wern. Soc. 4: 309. 1822. *Pajar-mullaca.*

Subligneous herb or shrub, from 3 to 5 feet high. Flowers with yellowish white or pinkish petals and white stamens. Fruit purple or purplish black, succulent, and edible; seeds minute.—Abundant throughout the lowland and occasionally in the upland in clearings (alt. up to 3,500 ft.); widely distributed throughout tropical America.

Loreto: lower Nanay, *465*—herbarium material only.

Clidemia naevula (Naud.) Triana, Trans. Linn. Soc. 28: 137. 1871.

Shrub, approximately 9 feet tall. Bark reddish or dark chocolate brown; inner bark slightly fibrous. Young branches, petioles, and peduncles covered with pilose pubescence. Leaf blades petiolate, ovate or oblanceolate, membranaceous, glandulose-pilose above, slightly pubescent beneath. Flowers in panicles, with white petals. Berry subglobose, pilose; May–June.—Common in the lowland in thickets and clearings (alt. 380 ft.); reported also from the Brazilian Amazon and British Guiana.

Sapwood pale yellowish white with a grayish cast, fairly lustrous; heartwood dull pinkish brown, thin. Wood straight- or interlocked-grained; very fine-textured; light in weight. Growth rings occasionally visible owing to variation in color. Parenchyma indistinct or barely visible with lens on cross section. Pores minute and scarcely discernible to aided eye; fairly numerous and well scattered; solitary, infrequently in multiples or rows; open or closed. Vessel lines fine and faintly discernible without lens. Rays very fine, numerous, closely spaced, and wavy on cross section; indistinct on tangential; slightly darker than background on radial surface.

Loreto: Caballo-cocha, *2121, 2184;* herbarium material collected also in the upper Nanay region.

4. GRAFFENRIEDA DC.

Graffenrieda limbata Triana, Trans. Linn. Soc. 28: 70. 1871. *Díspero-sacha, Níspero-sacha.*

Small tree, 21 feet tall. Crown open. Trunk bent, round, slender, and free of branches for half the entire height. Bark pinkish or dark chocolate brown and moderately smooth. Fruiting in

December–January.—In semi-open dry loam among low trees and shrubs (alt. 1,500 ft.).

Wood uniform pale brown throughout; odorless and tasteless; straight-grained; fairly fine- or medium-textured; light in weight, but firm and strong; easy to work, takes a fairly smooth finish with a moderately high luster when held to proper light, and holds its place and color well; fairly durable. Growth rings absent or present; visible owing to variation in abundance or alinement of parenchyma. Parenchyma in rather broad, widely and evenly spaced, continuous, concentric bands. Pores of medium size; few or fairly numerous, evenly distributed; in radial multiples of 2–5, less frequently solitary; open. Vessel lines numerous, fairly fine, and slightly darker than background; deposit of calcium common, especially on tangential surface. Rays numerous, fine, evenly spaced, and visible only with lens on cross section; barely discernible without lens in proper light on radial surface.

San Martín: Tarapoto, *5893*.

5. HENRIETTELLA Naud.

Henriettella verrucosa Triana, Trans. Linn. Soc. 28: 144. 1871. *Uchpa-caspi.*

Tree, from 30 to 70 feet tall. Crown flat or open. Trunk straight and round to moderately so, up to 22 inches in diameter, either bifurcating 3 or 5 feet from the base or unbranched up to 25 feet. Bark pale yellow, tan, or light gray to reddish brown; inner bark creamy yellow. Leaves large and narrow. Flowers small, sessile or short-stalked. Fruit small, round, borne on the main branches; seeds obovoid, numerous; July–August.—Common throughout the lower Peruvian Amazon and in some regions in the upland (alt. 380–1,800 ft.); in sandy or dry loam in pastures or in old clearings.

Sapwood whitish or creamy yellow with extensive slaty or dark grayish areas caused by sapstain; heartwood dull reddish brown, often with broad, chocolate brown streaks. Wood odorless, but has a slightly bitter taste; straight- or irregular-grained; medium- or fairly coarse-textured; light or moderately so, but strong for its weight; requires a sharp knife to cut smoothly across grain, saws woolly at times, fairly lustrous; not durable. Growth rings absent. Parenchyma sparsely developed; paratracheal or in indistinct, broken, tangential bands. Pores faintly to readily discernible without lens as numerous fine pinpoints; well distributed; solitary or, more frequently, in radial multiples of 2–3, seldom in small clusters;

open or filled with calcium or dark brown gum. Vessel lines short, fine, but visible to unaided eye; white or dark gray deposits frequently present. Rays numerous, closely spaced, curving at point of contact with pores, and lighter-colored than adjacent fibers on cross section; distinguishable only with lens on all surfaces.

Loreto: Pebas, *1717, 1736, 1864;* Caballo-cocha, *2091;* La Victoria, *2972.*—San Martín: Lamas, *6392.*

6. LEANDRA Raddi

Leandra sp.(?) *Yuto-banco.* Medium-sized tree, from 35 to 60 feet in height. Crown open. Trunk straight, cylindrical, and up to 12 inches or more in diameter. Bark light to dark brown, with coarse, horizontal ridges. Flowers small or minute, 5-parted, in terminal panicles. Fruit a small berry.—Scattered throughout the forest of the lower Itaya (alt. 400 ft.). Wood is employed to a limited extent for general carpentry and fuel.

Wood grayish or pinkish brown with pale purplish streaks and slaty gray areas; odorless and tasteless; straight- or roey-grained; fairly fine- or medium-textured; of medium weight to rather heavy; inclined to be splintery, easy to cut, takes a smooth finish with a moderate luster; liable to check in drying; durable. Growth rings absent or indistinct. Parenchyma invisible. Pores small; numerous and uniformly distributed; solitary, less frequently in small radial multiples, seldom in small clusters; mostly open. Vessel lines fine, short, and slightly darker than adjacent elements. Rays fairly broad, evenly spaced, and sinuous on cross section; distinct on radial surface.

Loreto: lower Itaya, *45.*

7. MERIANIA Sw.

Meriania Spruceana Cogn. in DC. Monogr. Phan. 7: 426. 1891. *Cruz-chillca.*

Small tree, not exceeding 20 feet in height. Crown spreading. Trunk bent, fairly round, slender, and branching 3 or 4 feet from the base. Bark very thin, pale pinkish brown, scaly. Leaf blades lanceolate. Flowers with pale red or yellow petals; December to beginning of February.—Limited in its occurrence to the upland (alt. 4,000 ft.); in clearings and on hill slopes. Wood is used for fuel only.

Wood pale grayish white, turning to pale yellow on exposure; fresh wood slightly fragrant, odor and taste absent or not distinctive

in dried material; straight-grained; fairly fine- and uniform-textured; of medium weight to fairly heavy, tough, and strong; easy to work, takes a smooth, fairly lustrous polish, and holds its place well when finished; durable. Growth rings present. Parenchyma in short, broken, irregularly spaced, tangential or oblique bands; barely discernible to unaided eye on moistened cross section. Pores of small or medium size; not numerous, evenly distributed; solitary, less often in radial multiples of 2–3, seldom in small radial rows or in small clusters; mostly open. Vessel lines short, fine, and barely distinguishable without lens. Rays very fine and indistinct even with lens on cross and tangential sections; slightly darker-colored than adjacent elements and rather distinct on radial surface.

San Martín: San Roque, *7010*.

8. **MICONIA** Ruiz & Pavón

The largest genus of the family, composed of shrubs or small, less frequently medium-sized, trees. Leaves small or large, entire or toothed. Flowers 4–9-parted, in terminal panicles; petals usually white. Fruit a small, edible berry, blue, purple, or black. The timbers are of some local importance for general construction. The local name "mullaca" is applied to all or most species of this genus.

Sapwood varies in color from whitish or oatmeal to pale brown, often streaked or with a grayish cast; heartwood usually dark chocolate brown, also with a grayish tinge. Wood odorless and tasteless; fairly fine- to medium-textured; light and soft to heavy, hard, and compact; splintery and at times saws woolly, usually capable of taking a smooth polish; fairly durable to durable. Parenchyma paratracheal or in fairly fine to broad, broken or continuous, concentric or tangential lines or bands; indistinct to visible. Pores small to medium-sized; not numerous to numerous; solitary or in multiples, less frequently in rows or small clusters; open or filled with calcium deposit. Rays fine or very fine, numerous, closely spaced on cross section, often curving at point of contact with the pores; invisible without lens on tangential; not visible to unaided eye on radial surface or, in a few instances, distinguishable; heterogeneous, seldom showing a slight tendency to homogeneous; mostly 1–3 cells wide and up to 15–20 cells high.

Miconia amazonica Triana, Trans. Linn. Soc. 28: 103. 1871; Mart. Fl. Bras. 14, pt. 4: 241. 1887. *Díspero blanco, Díspero-sacha, Níspero-sacha, Níspero-sacha blanco.*

Small tree, up to 30 feet in height. Crown spreading. Trunk round, usually bent, slender, and clear of branches up to three-fourths the entire height. Bark dark purplish brown, fairly smooth or with low ridges. Leaves dark green and glabrous above, light brown beneath. Flowers deep pink, fragrant; September to beginning of October.—Not common; in sandy loam among low trees and shrubs of secondary growth (alt. 600–1,400 ft.). Wood is employed for fuel only.

Wood lustrous whitish with a grayish tinge; odorless and tasteless; straight-grained; fine- or medium-textured; light in weight, but firm and strong; saws woolly, easy to cut, and takes a smooth polish; liable to check in drying. Growth rings present. Parenchyma in broken, undulating, unevenly spaced, concentric lines or fine bands; visible only with lens on moistened cross section. Pores small; fairly numerous and well distributed; solitary, less frequently in radial multiples or rows of 2–4; open. Vessel lines fine, but discernible without lens. Rays fine and numerous; discernible only with lens on cross and radial surfaces; indistinct on tangential.

San Martín: Tarapoto, *6076;* herbarium material collected also in the lower Huallaga, Department of Loreto.

Miconia amplexans (Crueg.) Cogn. in Mart. Fl. Bras. 14, pt. 4: 256. 1887. *Pichirina.*

Small tree of the lowland forest, from 15 to 25 feet in height. Crown conical or spreading. Trunk moderately straight, cylindrical, slender, and unbranched up to 12 feet. Bark pale creamy yellow to russet brown, smooth or moderately so. Leaves glabrous above and with fine pinkish brown pubescence beneath. Flowers bluish or lilac-colored; April–June. Fruit subglobular; September–October.—Common throughout the lowland (alt. 380–500 ft.); among low trees and shrubs. Wood is not used locally.

Sapwood distinctly defined, lustrous pale brown; heartwood chocolate brown, perishable. Wood has no distinctive odor, but slightly bitter to taste; straight-grained; fine- or medium-textured; of medium weight or moderately heavy, compact, and strong; saws slightly woolly, easy to cut, and takes a smooth finish. Growth rings absent or present owing to slight variation in depth of color. Parenchyma in wavy, broken or continuous, concentric bands. Pores small or fairly small; moderately numerous and well distributed; solitary, less often in radial multiples or rows of 2–4; open. Vessel lines short, fine, but discernible without lens. Rays fine and dis-

tinguishable only with lens on cross and tangential surfaces; slightly darker than adjacent elements on radial.

Loreto: upper Nanay, *677;* Pebas, *1577, 1633;* Caballo-cocha, *2049;* Yurimaguas, *4259.*

Miconia aulocalyx Mart. ex Triana, Trans. Linn. Soc. 28: 115. 1871; Fl. Bras. 14, pt. 4: 267. 1887.

Shrub, about 15 feet tall and flat-topped. Bark pale pinkish brown, moderately smooth or scaly.—Fairly common; in thickets or along margin of dense, flood-free forest (alt. up to 600 ft.).

Sapwood pale grayish or light brown, fairly lustrous; heartwood dull brown, thin. Wood of light or medium weight, firm; takes a smooth finish. Growth rings present. Parenchyma in more or less regular, evenly spaced, concentric bands. Pores minute or small; open or closed. Vessel lines indistinct. Rays numerous, very fine, and barely discernible with lens on all surfaces.

Loreto: lower Nanay, *485, 487;* Puerto Arturo, lower Huallaga, *5282.*

Miconia aurea Naud. Ann. Sci. Nat. III. 16: 244. 1851.

Shrub, 10 feet tall, with a slender trunk branching from near the base. Bark grayish or dark violet brown.—Common in the lower Huallaga and reported also from the Chanchamayo Valley (alt. 450–5,000 ft.); in dense forest.

Wood pale yellow or white, occasionally with pinkish streaks and extensive grayish areas caused by stain in drying; fairly lustrous; light, but firm; easy to cut. Growth rings present. Parenchyma in short, tangential bands; visible only with lens. Vessel lines fine, but visible without lens. Rays faintly discernible to aided eye on cross section; indistinct on tangential; lighter-colored than background and barely distinguishable without lens on radial surface.

Loreto: Yurimaguas, *7858.*

Miconia bubalina (D. Don) Naud. Ann. Sci. Nat. III. 16: 244. 1851.

Tall shrub or small, slender tree, from 13 to 22 feet in height. Crown spreading. Trunk straight, cylindrical, and undivided for from one-half to three-fourths the height. Bark pale yellow or light brown, finely fissured.—Common in the vicinity of Iquitos (alt. 400 ft.); in old clearings or moderately dense, low forest. Wood has no local application.

Sapwood lustrous pale yellow or light brown with darker streaks; heartwood dark brown. Wood roey- or straight-grained; of medium weight. Pores small; often closed. Vessel lines fine, slightly darker than background, and discernible to unaided eye; grayish white deposits or tyloses often present.

Loreto: near Iquitos, *3666, 3707.*

Miconia calvescens (Schrad. & Mart.) DC. Prodr. 3: 185. 1828.

Small tree, not exceeding 35 feet in height. Crown spreading. Trunk moderately straight, cylindrical, 7 inches or more in diameter, and unbranched up to 22 feet. Bark pale brown, fairly smooth or scaly. Flowers pale pink or white. Fruit ovoid, pinkish brown or yellow when mature; July–October.—Very abundant and widely distributed throughout the lowland, especially between the Itaya River and the Peruvian-Brazilian boundary (alt. 350–450 ft.); in alluvial or dry loam in thickets or along margin of forest. Wood is sometimes employed for fuel.

Sapwood pale white or light yellowish brown with a grayish cast, darkening somewhat on exposure; heartwood pale pinkish or dark brown. Wood fine- or medium-textured; of light or medium weight; saws slightly woolly, easy to cut, and takes a smooth, fairly lustrous finish; liable to check in drying.

Loreto: lower Itaya, *297;* near Iquitos, *1479;* Caballo-cocha, *2116;* upper Itaya, *3314, 3367.*

Miconia cannabina Markgr. Notizbl. Bot. Gart. Berlin 9: 1145. 1927. *Mullaca.*

Common shrub, about 12 feet in height. Bark pinkish brown, wrinkled. Flowers with pale green or pinkish sepals, white petals, deep pink staminal filaments, and purplish anthers; April–May.—In thickets or along banks of streams (alt. 400 ft.).

Sapwood distinctly demarcated, lustrous pinkish brown; heartwood greenish brown, perishable. Wood fine-textured; light in weight, but tenacious and strong.

Loreto: Morona-cocha, near Iquitos, *65.*

Miconia capitata Ule, Notizbl. Bot. Gart. Berlin 6: 360. 1915.

Shrub, 12 feet tall. Bark yellowish or light brown, smooth or with low, interwebbing ridges. Flowers small, with bluish white petals and yellowish or pale brown anthers; June–July.—Forming undergrowth in dense forest (alt. 400 ft.).

Wood pale creamy yellow, moderately lustrous; uniformly fine-textured. Rays very fine; indistinct without lens on all surfaces.

Loreto: Pebas, *1634*.

Miconia chrysophylla (L. C. Rich.) Urb. Symb. Antill. 4: 459. 1910. *Puca-mullaca.*

Shrub, about 16 feet in height. Bark reddish or dark chocolate brown to almost black, fairly smooth or scaly.—Widely distributed in the lowland, but not common; in open, dry loam.

Sapwood pale grayish brown or light pink, sometimes turning to dark brown on exposure; heartwood thin, brown. Wood fine-textured; moderately heavy, hard, and tough; fairly easy to cut and takes a smooth, lustrous finish; susceptible to insect attacks. Pores small; often filled with light brown or yellowish deposit. Vessel lines fine, but discernible to unaided eye. Rays indistinct or visible without lens on radial surface.

Loreto: near Iquitos, *3660;* Yurimaguas, *4809*.

Miconia clavistyla Gleason, Bull. Torrey Club 58: 229. 1931.

Shrub, 18 feet in height. Bark pale yellow or light brown, fairly smooth or with minute scales. Fruit bluish black, globose; April. —Not common; along banks of streams in low growth (alt. 400 ft.).

Wood creamy yellow and highly lustrous; rather fine-textured; of light or medium density; fairly easy to cut; subject to stain. Growth rings present. Parenchyma in broken or continuous, concentric lines. Pores small; solitary, less frequently in radial or tangential multiples or rows of 2; open. Rays invisible to unaided eye on all surfaces.

Loreto: lower Nanay, *373*.

Miconia dichrophylla Macbr. Field Mus. Bot. 4: 189. 1929. *Caracha-caspi, Mullaca-caspi, Ubiamba.*

Tree, up to 36 feet in height. Crown spreading. Trunk moderately straight, cylindrical, about 10 inches in diameter, and unbranched for from 1 to 15 feet. Bark reddish brown, in young trees with numerous, minute, shallow fissures, in old trees scaly. Fruit light brown; November–December.—Common; in sandy loam in thickets (alt. 600–1,800 ft.). The durable timber is esteemed for piling and house construction.

Sapwood well defined, light or dark brown with grayish cast, occasionally with darker brown streaks; heartwood dark reddish

or grayish chocolate brown. Wood straight- or irregular-grained; uniformly fine-textured; hard, heavy, and tenacious or fairly so; moderately easy to work and takes a smooth, fairly lustrous finish; susceptible to insect attacks. Pores small; numerous and tending to be crowded; frequently filled with yellowish deposit. Vessel lines short, fine, but discernible without lens.

Loreto: Yurimaguas, *4886.*—San Martín: Tarapoto, *5891, 6586;* Lamas, *6472.*

Miconia Donaeana Naud. Ann. Sci. Nat. III. 16: 244. 1851. *Nucñu-mullaca.*

Tree, from 10 to 30 feet in height. Crown round. Trunk cylindrical, straight or moderately so, slender, and undivided for two-thirds the height. Bark light grayish brown, fairly smooth. Flowers purplish; December–February.—Limited to the upland (alt. 3,500 ft.); in dense forest. Wood is used for fuel only.

Sapwood creamy yellow or light brown; heartwood pale brown or pinkish, thin, and not sharply defined. Wood medium-textured; moderately light in weight; saws slightly woolly and easy to work; not durable. Pores of medium size, but invisible to unaided eye; not numerous to numerous and uniformly distributed; in small multiples or rows, less frequently solitary; open.

San Martín: San Roque, *7002, 7055.*

Miconia egensis Cogn. in Mart. Fl. Bras. 14, pt. 4: 374. 1887.

Tree, from 15 to 20 feet tall. Crown spreading. Trunk straight, columnar, and slender. Bark greenish or light brown, smooth or with deep, coarse fissures.—Abundant in the lower Peruvian Amazon (alt. 350–400 ft.); in dry or slightly humid loam in dense forest. Wood has no local application.

Wood light brown throughout, in some specimens with streaks of darker brown and grayish cast; of medium weight; capable of taking a smooth finish; likely to check in drying. Growth rings present. Parenchyma in fine concentric bands. Pores small; not numerous and uniformly distributed; solitary, less frequently in radial multiples of 2.

Loreto: Pebas, *1637;* La Victoria, *2703.*

Miconia heteromera Naud. Ann. Sci. Nat. III. 16: 124. 1851.

Shrub, from 4 to 11 feet tall. Bark pale gray or greenish brown, smooth. Fruit reddish or light brown when mature; July.—Common

near the Peruvian-Brazilian boundary (alt. 380 ft.); along margin of flood-free forest.

Sapwood pale grayish brown; heartwood dull brown. Wood fine-textured; of medium weight; easy to cut and takes a smooth finish. Growth rings present. Parenchyma in very fine, short, irregular or concentric lines. Pores small; fairly numerous; solitary or in small radial multiples or rows; often filled with light brown or white deposits.

Loreto: La Victoria, *2985*.

Miconia juruensis Pilger, Verh. Bot. Ver. Brandenb. 47: 172. 1905. *Caracha-caspi*.

Tree or shrub, from 10 to 15 feet tall. Crown spreading. Trunk cylindrical, moderately straight, and from 5 to 8 inches in diameter. Bark yellowish or pinkish brown, scaly. Flowers white, in short panicles; April–June.—Not common; along banks of streams or in secondary growth (alt. 400 ft.). Timber is used to a limited extent for fuel.

Wood variable in color from pale yellowish white with extensive grayish areas to uniform light brown; odorless, but has a slightly bitter taste; fine- or medium-textured; of medium weight or fairly heavy; moderately easy to work and takes a smooth finish with a moderate luster. Growth rings present. Parenchyma in irregular, short or fairly continuous, concentric bands. Pores small; not very numerous, uniformly distributed; solitary or in radial multiples or rows of 2–3; open.

Loreto: lower Nanay, *481;* lower Huallaga, *5186* (*M.* aff. *juruensis*); the species was collected originally by Ule along the Jurua River, Brazil.

Miconia lepidota DC. Prodr. 3: 180. 1828.

Small tree, not exceeding 28 feet in height. Crown spreading. Trunk straight, cylindrical, from 5 to 8 inches in diameter, and unbranched for 3 feet. Bark 0.25 inch thick, pale brown or dark gray, and scaly. Fruit small, light brown when mature; October–November.—Fairly common in the lower Huallaga (alt. 450 ft.); in dry loam in clearings or along margin of forest. Wood has no local application.

Wood lustrous pale white, creamy yellow, or light brown, darkening on exposure; tasteless and odorless; rather fine-textured; fairly heavy, strong, and compact, but splinters readily; fairly easy to

work; likely to check, and subject to stain, in drying. Growth rings present owing to arrangement of parenchyma and pores. Parenchyma in sinuous, short or continuous, concentric bands, fairly distinct with lens. Pores barely distinguishable without lens; rather numerous, uniformly distributed; solitary or in radial multiples or rows of 2–4; open.

Loreto: lower Huallaga, *4693*.

Miconia longifolia (Aubl.) DC. Prodr. 3: 184. 1828. *Rifari.*

Small or medium-sized tree, seldom more than 45, most frequently between 15 and 30, feet tall. Crown open. Trunk straight or contorted, moderately round, from 7 to 14 inches in diameter, and branching from the base or undivided up to about 6 feet. Bark pale yellow or light pink to dark purplish brown, fairly smooth or with deep fissures. Flowers small, white. Fruit a small berry, turning black at maturity.—Abundant throughout the lowland (alt. 380–500 ft.); in thickets and old clearings. Wood is esteemed for general carpentry and house construction.

Sapwood pale brown or pinkish; heartwood dull brown. Wood straight- or irregular-grained; moderately fine-textured; fairly heavy and strong, but splinters rather readily; takes a smooth, fairly lustrous finish; likely to check in drying; susceptible to insect attacks. Growth rings sometimes distinct. Parenchyma indistinct or visible with lens as fine, short or continuous, concentric bands. Pores small; fairly numerous, well distributed; solitary or in small radial multiples or rows; often filled with yellowish or light brown deposit. Vessel lines short, fine, but distinguishable to unaided eye.

Loreto: La Victoria, *2753;* Paraíso, upper Itaya, *3280;* San Antonio, upper Itaya, *3402, 3506;* Santa Rosa, *4769, 4912,* and Puerto Arturo, lower Huallaga, *5350.*

Miconia longiracemosa Gleason, Bull. Torrey Club 58: 232. 1931. *Bucacuru-caspi.*

Tree, from 12 to 30, rarely 40, feet in height. Crown spreading. Trunk moderately straight, columnar, about 12 inches in diameter, and unbranched for from 1 to 12 feet. Bark pale pink or dark brown, fairly smooth. Flowers small, white, and fragrant. Fruit a small, round, red berry; September–October.—Of common occurrence throughout the lowland, especially between Iquitos and the lower Huallaga (alt. 380–500 ft.); most frequently along banks of streams or along margin of dense forest. Timber is sometimes employed for house posts and general carpentry.

Sapwood light brown, occasionally with pale grayish areas; heartwood dark violet brown, perishable. Wood straight- or irregular-grained; medium-textured; of medium weight or moderately heavy, compact, strong, but splinters rather readily; not easy to cut; checks in drying; susceptible to stain and insects.

Loreto: lower Itaya, *115;* lower Nanay, *604;* upper Itaya, *3296;* lower Huallaga, *4038, 4167, 4249, 4349.*

Miconia macrophylla (D. Don) Triana, Trans. Linn. Soc. 28: 103. 1871; Mart. Fl. Bras. 14, pt. 4: 239. 1887. *Millua-caspi.*

Slender shrub, sometimes scandent, from 5 to 15 feet tall. Crown tapering. Bark pale yellow. Flowers white or pale yellow; June–July. Fruit light brown, turning purplish at maturity.—Very common in the lower Peruvian Amazon and reported also from the upland (alt. 380–4,000 ft.); most frequently in clearings or along banks of streams and lagoons.

Sapwood lustrous light brown; heartwood dark brown, thin. Parenchyma in regular, concentric lines. Pores small; open or filled with white deposit.

Loreto: Pebas, *1629;* collected also at La Victoria, Iquitos, and in the lower Huallaga.

Miconia minutiflora (Bonpl.) DC. Prodr. 3: 189. 1828; Mart. Fl. Bras. 14, pt. 4: 384. 1887.

Small, forest tree, approximately 22 feet in height. Crown dense, round. Trunk straight, cylindrical, slender, and clear of branches up to half the height. Bark yellowish or reddish brown, fairly smooth. Flowers yellow, fragrant. Fruit small, round, and grayish green when ripe; January–March.—Widely distributed, but nowhere abundant; in thickets or along margin of dense forest (alt. 380–4,000 ft.). Wood is not used locally.

Wood uniform light brown, occasionally with pale yellowish brown streaks; straight- or wavy-grained; medium-textured; of medium weight; fairly easy to cut and takes a smooth, fairly lustrous finish; likely to check in drying; durable. Growth rings absent. Parenchyma indistinct. Pores barely at limit of vision; solitary or in small radial multiples or rows; open. Vessel lines fine, but discernible without lens; often filled with lustrous tyloses.

Loreto: Pebas, *1616;* collected also in the middle Huallaga near Tarapoto, at Lamas, San Roque, and by others in the Chanchamayo Valley.

Miconia Macbridei Gleason, Bull. Torrey Club 58: 246. 1931.

Shrub, 5 or more feet tall, with purplish pink flowers and small, globose, pale blue fruit, maturing in December–January.—Not common; among rocks or in open sandy loam (alt. 1,800 ft.).

San Martín: Lamas, *5996*.

Miconia mollis Triana, Trans. Linn. Soc. 28: 115. 1871; Mart. Fl. Bras. 14, pt. 4: 341. 1887.

Uncommon shrub, 12 feet tall. Crown bell-shaped. Bark pale brown or purple, fairly smooth. Twigs covered with light brown pubescence. Flowering in December–February.—Fairly common; in open sandy loam (alt. 1,400 ft.).

Wood lustrous brown, occasionally with long, dark striping or pale grayish cast; slightly fragrant and sometimes slightly bitter to taste; medium-textured; light in weight, but firm and fairly compact. Growth rings present. Parenchyma indistinct. Pores at limit of vision; numerous, well distributed; solitary or in small radial multiples or rows; open. Vessel lines fine, short; often filled with yellowish white deposit. Rays visible without lens on moistened cross and radial surfaces. Pith large, septate.

San Martín: Rumisapa, near Tarapoto, *6768*.

Miconia parviflora (Benth.) Cogn. in Mart. Fl. Bras. 14, pt. 4: 249. 1887. *Sinchi-mullaca.*

Tree, about 60 feet in height. Crown spreading. Trunk straight, round, slender, and clear of limbs for about two-thirds the entire height. Bark deep pinkish brown, scaly. Flowers small, white; June–July. Fruit blue when mature.—Of limited distribution; in dense, flood-free forest (alt. 450 ft.). The durable timber is esteemed for pillars in the construction of huts.

Sapwood well defined, uniform light brown; heartwood dull dark brown. Wood straight-grained; uniformly fine-textured; heavy, hard, strong, and compact; not difficult to work, takes a smooth, lustrous finish. Growth rings present. Parenchyma in indistinct, wavy, concentric bands uniting the pores. Pores small; fairly numerous, well distributed; mostly solitary; open or closed. Vessel lines long, fine, but discernible without lens.

Loreto: upper Nanay, *901*.

Miconia Pilgeriana Ule, Notizbl. Bot. Gart. Berlin 6: 363. 1915. *Mullaca, Palo blanco.*

Fairly common, forest tree, from 18 to 40, occasionally up to 60, feet in height. Crown spreading. Trunk straight, cylindrical or moderately so, 12 inches or more in diameter, and branching from near the base or undivided up to half the entire height. Bark pale grayish white, smooth, thin. Fruit small, round, dark brown; July–August.—Most frequently in flood-free areas (alt. 380–450 ft.). Wood is sometimes used for beams in house construction.

Sapwood almost white when fresh, turning to yellow or dark brown on exposure; heartwood grayish brown, susceptible to insect attacks. Wood uniformly fine-textured; moderately heavy to heavy and tenacious; fairly easy to work, takes a smooth finish, and is strong. Growth rings present. Pores small, but visible to unaided eye owing to pale white or pinkish deposits often present.

Loreto: Pebas, *1718;* Caballo-cocha, *2155;* Paraíso, upper Itaya, *3339.*

Miconia Poeppigii Triana, Trans. Linn. Soc. 28: 107. 1871; Mart. Fl. Bras. 14, pt. 4: 319. 1887. *Rifari, Rupinia.*

Medium-sized, forest tree, from 50 to 60 feet in height. Crown spreading. Trunk erect, columnar, with small buttresses, about 22 inches in diameter, and clear of limbs up to 35 feet. Bark 0.5 inch thick, pale gray, yellowish, pinkish, or dark brown, and fairly smooth. Flowering in August–October. Fruit small, round, light or dark green.—Widely distributed, but not abundant, in the lowland; along margin of or in dense forest (alt. 380–500 ft.). Timber is used extensively for fuel and to a limited extent for general construction.

Sapwood yellowish or light brown, often with long, black streaks and grayish areas; heartwood dark brown, thin. Wood medium-textured; of light or medium weight; requires a sharp knife to cut smoothly across grain; checks in drying; susceptible to stain and insect attacks. Growth rings absent or present. Pores small; frequently filled with yellowish deposit.

Loreto: La Victoria, *2900;* upper Itaya, *3340;* Iquitos, *3698;* lower Huallaga, *4147, 4373, 4548.*

Miconia prasina (Sw.) DC. Prodr. 3: 188. 1828. *Isula-micuna, Mullaca-colorada, Millu-caspi.*

Small tree, from 12 to 30 feet in height. Crown spreading. Trunk straight, fairly cylindrical, about 7 inches in diameter, and branching a few feet from the base. Bark light brown, fairly smooth or with shallow anastomosing fissures. Fruit small, round; May–

June.—Fairly common in the lowland (alt. 400 ft.); in thickets or along margin of forest. Wood is not used locally.

Sapwood fairly well defined, uniform pale grayish or pinkish brown; heartwood grayish brown. Wood interlocked-grained; uniformly fine-textured; moderately heavy, tough, and strong; not difficult to work and takes a smooth, fairly lustrous finish; durable. Growth rings absent or present. Pores small; in some specimens open, in others filled with white deposit.

Loreto: lower Nanay, *572;* upper Nanay, *974;* La Victoria, *2936;* lower Huallaga, *4807.*

Miconia pteropoda Benth. in Hook. Journ. Bot. 2: 314. 1840. *Bucacuru-caspi, Yana-panga.*

Small or medium-sized, glabrous tree, from 15 to 50 feet in height. Crown spreading or rarely round. Trunk straight or moderately so, cylindrical, up to 12 inches in diameter, and clear of limbs up to 15 feet. Bark light or dark pinkish brown, fairly smooth. Flowers terminal; petals white and anthers cream-colored; March–April. Fruiting in May–August.—Fairly common in the lowland (alt. 380 ft.); in clearings, thickets, or more frequently along banks of streams. Wood is employed for fuel only.

Sapwood creamy yellow or light brown; heartwood dark purplish brown, thin. Wood moderately fine-textured; of light or medium weight, and splinters easily; not difficult to work and takes a smooth, lustrous finish; strong and durable, although liable to check in drying. Pith white.

Loreto: Pebas, *1636;* La Victoria, *2707, 2987.*

Miconia puberula Cogn. in Mart. Fl. Bras. 14, pt. 4: 386. *pl. 78.* 1887. *Uchu-mullaca.*

Shrub, from 15 to 18 feet tall. Bark light grayish brown, turning with age to dark purplish brown, fairly smooth or scaly. Flowers small, white; December–January.—Fairly common on the plain of Tarapoto (alt. 1,400 ft.); in secondary growth.

Sapwood fairly well demarcated, uniform light brown, occasionally with grayish striping; heartwood dull purplish brown. Wood heavy, hard, and compact; takes a smooth, fairly lustrous finish; strong and durable. Pores small; numerous; mostly in small radial multiples or rows.

San Martín: Morales, *5702;* Tarapoto, *6150.*

Miconia scorpioides (Sch. & Cham.) Naud. Ann. Sci. Nat. III. 16: 243. 1851.

Medium-sized tree, up to 50 feet tall. Crown spreading. Trunk straight, cylindrical, from 7 to 15 inches in diameter, and clear of limbs for about one-third the entire height. Bark pale grayish brown, fairly smooth. Fruiting in September–October.—Of limited distribution; in flood-free forest or along banks of streams (alt. 500 ft.). Wood is employed extensively for fuel.

Sapwood uniform light brown, occasionally with pale grayish streaks; heartwood purplish brown, perishable. Wood straight-grained; fine- or medium-textured; of medium weight, firm, and strong; easy to cut and holds its place well when finished; susceptible to insect attacks. Growth rings present. Parenchyma in broken, wavy, tangential bands. Pores small; open or closed.

Loreto: lower Huallaga, *4266*, *4607*.

Miconia serialis DC. Prodr. 3: 182. 1828. *Caracha-caspi.*

Small or medium-sized tree of the lowland, up to 50 feet in height. Crown spreading. Trunk cylindrical, often bent, about 12 inches in diameter, and unbranched for from 2 to 8 feet. Bark grayish or pinkish brown, scaly. Flowers white. Fruit small, round, pale green, 1-seeded; seeds dark brown.—Widely distributed, but not common; in clearings not subject to inundations. Wood is not used locally.

Sapwood uniform light brown; heartwood pale purplish brown. Wood interlocked- or irregular-grained; uniformly fine-textured; heavy, hard, and moderately tough; takes a smooth, rather lustrous finish; likely to check in drying; susceptible to insect attacks, but strong and durable. Pores small; open or closed. Vessel lines fine and lighter-colored than adjacent elements.

Loreto: Iquitos, *1508*, *3631;* lower Huallaga, *3836*, *4718*.

Miconia spennerostachya Naud. Ann. Sci. Nat. III. 16: 187. 1851.

Tree, about 45 feet tall. Crown spreading. Trunk moderately straight, round, slender, and clear of branches for about three-fourths the entire height. Bark light or purplish brown, fairly smooth. Fruit round, bluish black; July–August.—Uncommon; in dense forest free from periodical floods (alt. 380 ft.). Wood has no local application.

Wood uniform light brown with a pinkish cast, occasionally with pale gray striping; rather fine-textured; moderately light in weight, but firm and strong; easy to cut and takes a lustrous finish. Growth rings present owing to absence or variation in abundance of elements. Parenchyma in broken or continuous, fairly regular, concentric lines. Pores small; solitary or in radial multiples of 2; open or closed.

Loreto: Pebas, *1686*.

Miconia stelligera Cogn. in Mart. Fl. Bras. 14, pt. 4: 275. 1887. *Mullaca.*

Shrub, from 6 to 12 feet tall. Bark light or pale purplish brown, fairly smooth. Flowering in September–October. Fruit round, pale greenish brown.—Forming undergrowth in dense, flood-free forest (alt. 500–2,000 ft.).

Wood lustrous yellowish white with fine brown streaks and pale grayish bands; fairly fine-textured; moderately light in weight; saws slightly woolly, easy to cut; does not appear to be durable. Pith creamy or pinkish white.

Loreto: lower Huallaga, *4398*, *5093*.

Miconia stenostachya DC. Prodr. 3: 181. 1828. *Caracha-caspi.*

Tall shrub. Twigs covered with white or pale gray pubescence. Bark dark pinkish brown, scaly. Flowers with pale pink or white petals. Fruit yellow, turning to dark brown at maturity.—Common in the vicinity of Tarapoto and Lamas (alt. 1,300–1,800 ft.); in secondary growth.

Sapwood uniform pale brown, lustrous; heartwood grayish or purplish brown, thin. Wood uniformly fine-textured; rather heavy, strong, and compact; not difficult to cut and takes a smooth finish; durable. Growth rings and parenchyma indistinct. Pores small; solitary or in radial multiples of 2, seldom more; open or closed.

San Martín: Tarapoto, *5678*.

Miconia tetrasperma Gleason, Bull. Torrey Club 58: 237. 1931.

Tall shrub or small tree, up to 20 feet in height. Crown spreading. Trunk straight, round, slender, and branching a few feet above the base. Bark pale yellow or grayish, fairly smooth.—Common in the vicinity of Iquitos and fairly abundant also near the Peruvian-Brazilian frontier (alt. 350–400 ft.); in thickets and old clearings. Wood is not used locally.

Wood uniform light brown throughout; straight-grained; rather fine-textured; moderately heavy, strong, and tough; easy to cut, takes a smooth finish, and has a golden luster when freshly planed; probably durable. Growth rings present. Parenchyma not visible with lens.

Loreto: Iquitos, *3693*.

Other numbers of this genus determined provisionally:

Loreto: lower Nanay, *689;* upper Itaya, *3306, 3410;* lower Huallaga, *3823, 4230, 4458*.—San Martín: Lamas, *6485*.

9. MOURIRIA Juss.

Mouriria grandiflora DC. Prodr. 3: 8. 1828. *Charachuela.*

Small or medium-sized tree, about 35 feet in height. Crown spreading. Trunk straight, cylindrical, slender, and clear of limbs for about two-thirds the entire height. Bark pinkish brown and scaly. Leaves opposite, equal in each pair, sessile or short-stalked, entire, coriaceous, pinnate-nerved. Flowers small, fasciculate, axillary. Fruit baccate, globose.—Fairly common in the lowland in inundated forest (alt. 400 ft.); reported also from the lower and upper Brazilian Amazon. Timber is used mostly for fuel.

Sapwood well defined, pinkish, reddish, or pale grayish brown; heartwood dark purplish brown, perishable. Wood odorless and tasteless; straight- or irregular-grained; moderately fine-textured; heavy, hard, tenacious, and strong; fairly easy to cut and capable of taking a smooth finish. Growth rings visible owing to alinement of elements. Parenchyma abundantly developed; paratracheal or in short, broken or fairly continuous, tangential bands. Pores rather small to medium-sized; not very numerous, well distributed; solitary, but more frequently in radial or tangential multiples or rows of 2, seldom in small clusters; sometimes filled with lustrous tyloses. Vessel lines fine, but at limit of vision. Rays very fine, fairly numerous, and barely discernible to aided eye on cross and tangential sections; at times barely distinguishable without lens on moistened radial surface.

Loreto: lower Itaya, *8125*.

10. OSSAEA DC.

Ossaea micrantha (Swartz) Macfad. Fl. Jamaica 2: 49, 100. 1850.

Slender shrub, about 6 feet tall. Bark pale brown, fairly smooth. Twigs glabrous. Leaves longitudinally 3–9-nerved, petiolate, entire,

acuminate, acute at base. Flowers in loose axillary panicles, white, 4-parted. Fruit baccate, subround, black when mature; July–August.

Wood oatmeal-colored or creamy yellow throughout; has no characteristic odor or taste; straight- or interlocked-grained; uniformly fine-textured; of light weight; easy to cut; not durable. Growth rings present owing to variation in abundance of elements. Parenchyma in numerous, fine, slightly wavy, irregularly spaced, broken or continuous, concentric lines. Pores minute and invisible or faintly discernible with lens; not numerous and uniformly distributed; solitary, rarely in small multiples; occasionally filled with white deposit. Vessel lines very fine and short. Rays extremely fine, numerous, and closely spaced on cross section, barely distinguishable with lens; indistinct on tangential and radial surfaces.

Loreto: upper Itaya, *3465*.

11. TIBOUCHINA Aubl.

Tibouchina ochypetala (Ruiz & Pavón) Baill. Adansonia 12: 75. 1877. *Machu-sacha pichirina, Santa Rosa sisa.*

Small or medium-sized tree, from 15 to 45 feet in height. Crown flat. Trunk straight, round, slender, and clear of limbs up to more than half the entire height. Bark dark reddish brown or chocolate-colored, occasionally with grayish patches; inner bark fibrous. Leaves pubescent on both surfaces. Flowers bright purple, white, or lavender-colored; December–January. Fruit capsular, 5-valvate. —Not common; in sandy or heavy loam among shrubs and low trees of secondary growth (alt. 1,300–1,800 ft.); reported also from La Merced, in the Chanchamayo Valley, and Vilcabamba (alt. up to 2,600 ft.).

Sapwood white when fresh, but turns to pale pinkish brown on exposure; heartwood dull dark brown, thin. Wood has no distinctive odor or taste; straight-grained; fairly fine- or medium-textured; of medium weight to rather heavy; tending to be splintery, not difficult to cut, takes a smooth polish, and holds its place well when finished; susceptible to insects; moderately durable. Growth rings absent or present; visible owing to slight variation in depth of color. Parenchyma paratracheal and occasionally terminal; sparingly developed and indistinct or barely discernible with lens. Pores fairly small or medium-sized; few to fairly numerous, well distributed; solitary or in radial multiples of 2, sometimes more, less frequently in diagonal pairs or in small clusters; open or closed. Vessel lines

fairly fine, but at limit of vision; sometimes filled with pale grayish deposit. Rays numerous, closely spaced, fine or moderately fine, and sometimes distinguishable without lens on moistened cross section; invisible or faintly visible to unaided eye on tangential; dark pinkish brown and sometimes conspicuous on radial surface.

San Martín: Tarapoto, *5953;* Lamas, *6385, 6492.*

12. TOCOCA Aubl.

Shrubs or small trees. Leaves large, petiolate, entire or toothed; stems and petioles covered with long, rather thick bristles. Flowers small or large, in terminal panicles. Fruit a berry.

Sapwood pale brown with a grayish tinge or streaked with yellow; heartwood dark brown. Wood odorless and tasteless; fairly fine-textured; of light to medium density; slightly fibrous, not difficult to work; not durable. Parenchyma in fine, broken, concentric bands, sometimes invisible with lens. Pores small; few to fairly numerous; solitary, less frequently in multiples; often filled with grayish white deposit of calcium. Rays fine or very fine, sometimes wavy on cross section; invisible on other surfaces.

Tococa egensis Naud. Ann. Sci. Nat. III. 16: 92. 1851.

Shrub or small tree, sometimes scandent, up to 21 feet tall. Crown open. Trunk bent, round, slender, and branching 2 or 3 feet from the base. Bark dark brown, fairly smooth. Fruit round, black when mature; June–July.—Not common; in open dry loam among shrubs or small trees (alt. 400 ft.).

Wood yellow when freshly cut, turning on exposure to pale brown with a grayish cast; odorless and tasteless; of light to medium weight; straight-grained; fairly fine-textured; slightly fibrous, easy to cut, and takes a smooth finish. Growth rings absent or poorly defined. Parenchyma indistinct or in very fine, broken, concentric bands. Pores fairly small; moderately numerous, well scattered; in small radial multiples, less frequently solitary or in small clusters; mostly open. Vessel lines appear as long, fine scratches. Rays numerous, very fine, and barely discernible with lens on all surfaces.

Loreto: lower Itaya, *43;* Caballo-cocha, *2463.*

Tococa juruensis Pilger, Verh. Bot. Ver. Brandenb. 47: 176. 1905.

Small shrub or ligneous herb. Bark pale or dark purplish brown, fairly smooth. Flowers pink; June–July.—Fairly common around Pebas (alt. 380 ft.); in humid loam in dense forest.

Wood pale brown with greenish gray areas; straight-grained; moderately fine-textured; light in weight; easy to cut. Growth rings present. Parenchyma indistinct. Pores small; few and scattered. Vessel lines very fine and barely discernible without lens. Rays lighter-colored than background and at limit of vision on moistened cross section; indistinct on other surfaces.

Loreto: Pebas, *1940.*

ONAGRACEAE. Evening Primrose Family

1. JUSSIAEA L.

Jussiaea latifolia Benth. in Hook. Journ. Bot. 2: 317. 1840.

Shrub, about 9 or 10 feet tall. Crown dense, round. Trunk straight, cylindrical, slender, and branching from near the base. Bark pinkish or dark brown, fairly smooth. Leaves alternate, entire, oblongate or lanceolate, acute at base, acuminate at apex, membranaceous, glabrous above, pubescent beneath. Flowers axillary; petals yellow. Fruit brown, small, and with numerous, yellowish brown, winged seeds; June–July.—Common throughout northeastern Peru, especially in the lowland (alt. 450–3,500 ft.); in slightly humid loam in clearings or in fairly dense forest.

Sapwood lustrous grayish brown; heartwood dark gray or almost black, perishable. Wood odorless and tasteless; straight-grained; medium-textured; light in weight and fairly soft, but strong; easy to cut. Growth rings indistinct. Parenchyma paratracheal; indistinct. Pores of medium size or fairly large; fairly numerous or numerous and well distributed; solitary or in radial multiples of 2–4, seldom in small clusters; open. Vessel lines fine, but distinguishable to unaided eye. Rays fine and irregularly spaced on cross section; sometimes visible to unaided eye on radial.

Loreto: lower Nanay, *315;* Caballo-cocha, *2118;* collected also at San Roque, Department of San Martín.

ARALIACEAE. Ginseng Family

Trees or shrubs, rarely herbs, with watery juice. Leaves alternate, simple or compound, with stipules. Flowers perfect or of separate sexes, in heads or umbels, small, greenish; calyx tube adnate to the ovary; petals usually 5; stamens as many as the petals. Fruit a berry, containing 2–7 one-seeded nutlets.

Woods white or grayish, subject to stain; rather light, but firm and tenacious; medium-textured; easy to work; perishable; lumber suitable for box boards, interior construction, and possibly for paper

pulp. Parenchyma indistinct. Pores of fairly small or medium size; fairly numerous or numerous, diffuse; solitary or in small multiples. Rays broad; usually distinct on all sections. Small radial intercellular canals are present along margin of pith and common in rays.

The perforations of the vessels are mostly simple, but they may be scalariform with several bars, reticulate, or composite; intervascular pits large, irregular, with conspicuous borders; vessel-parenchyma pits large, simple to bordered. Rays heterogeneous, with a tendency to homogeneous; multiseriate (2–10 cells wide) and rather few. Fibers often septate.

1. DIDYMOPANAX Decne. & Planch.

Didymopanax Morototoni (Aubl.) Decne. & Planch. Rev. Hort. IV. 3: 109. 1854. *Sacha-uva.*

The best-known species of the genus, widely distributed throughout tropical South America from Colombia to Brazil, and characteristic of the open forests, in abandoned clearings, or along margin of savannas. Tree of medium size, although said to attain a height at times of up to 100 feet or more. Crown spreading; branches few and confined to the summit. Trunk straight, cylindrical, and from 9 to 20 inches in diameter. Bark light brown, smooth, and has a bitter taste. Leaves long-stalked, large, the 7–10 leaflets subleathery, entire, oblongate, acuminate at apex, rounded or acute at base, densely tomentose beneath. Flowers white, in large panicles. Fruit ovoid-compressed, pale green, 2-celled, borne at tip of branchlets; November–December.—Common in the upland, usually in secondary growth (alt. 1,300–3,500 ft.). The soft wood is used for crates and general carpentry.

Wood pale or grayish brown, sometimes with a yellowish tinge, not clearly defined into sap and heart; has no characteristic odor or taste; straight- or fairly straight-grained; rather coarse-textured; light in weight and of about the same consistency as alder (*Alnus*); easy to work, rather brittle, and lacks figure; not durable and subject to blue stain. Growth rings indistinct. Parenchyma in indistinct, scattered cells. Pores small; numerous, evenly distributed; solitary or in radial multiples of 2–4, seldom in small clusters. Vessel lines moderately fine and inconspicuous; tyloses sometimes present. Rays broad and uniform on cross section; distinct on all surfaces, especially on radial. Small radial canals along margin of pith and common in the rays.

Vessel perforations may be simple, scalariform with several bars, reticulate, or composite; pits are large, irregular, with conspicuous borders. Rays homogeneous or tending to heterogeneous; 5 cells wide, marginal cells usually larger than interior cells. Fibers septate.

San Martín: Tarapoto, *5452*.

2. GILIBERTIA Ruiz & Pavón

Gilibertia Williamsii Harms, Notizbl. Bot. Gart. Berlin 11: 490. 1932. *Achcu-isman.*

Tree, ranging in height from 40 to 45 feet or more. Crown spreading. Trunk straight, round, 12 inches in diameter, and unbranched for from 20 to 25 feet. Bark light tan-colored and has a spicy odor when fresh; inner bark somewhat fibrous. Leaves long-stalked, simple. Flowers pale red; January.—Uncommon; in fairly dense forest (alt. 3,500 ft.).

Wood dirty white to pale brown; has no characteristic odor or taste; straight- or fairly straight-grained; medium-textured; light in weight, but firm; easy to cut and takes a dull finish. Growth rings present owing to variation in depth of color and abundance of elements. Parenchyma indistinct. Pores of fairly small or medium size; very numerous, uniformly distributed or tending to be crowded in zones; mostly in radial multiples or rows of 2–3, also solitary or in tangential pairs, seldom in clusters. Vessel lines moderately fine and of same color as background, but distinguishable without lens; translucent tyloses common. Rays distinct on all surfaces. Small radial canals present, mostly in margin of pith. Pith medium brown; grayish white crystals of calcium oxalate (raphides) common.

Rays heterogeneous; 3–6 cells wide and 24 cells or more high.

San Martín: San Roque, *7398*.

3. NOTHOPANAX Seem.

Nothopanax sp. Shrub, about 8 feet tall. Bark papyraceous, light brown, and with low ridges. Leaves membranaceous, serrate, rounded or cordate at base, and petiolate.—In open dry loam, sometimes cultivated for hedges (alt. 400 ft.).

Wood pale yellow or light brown, becoming dark grayish on exposure; has no characteristic odor or taste; fairly straight- or slightly wavy-grained; fine-textured; light and soft; easy to cut; perishable. Growth rings absent or poorly defined. Parenchyma

not distinguishable with lens. Pores minute or small; fairly numerous, uniformly distributed; solitary or in radial multiples of up to 6. Vessel lines fine. Rays broad, but not very distinct on cross section; fairly prominent on radial. Small radial canals present along margin of pith and especially in the rays; distinct under lens.

Vessel perforations scalariform. Rays heterogeneous; up to 8 cells wide and 20 cells or more high.

Loreto: Iquitos, *3627*.

4. OREOPANAX Decne. & Planch.

Oreopanax Williamsii Harms, Notizbl. Bot. Gart. Berlin 11: 487. 1932. *Sacha-uvilla.*

Uncommon tree, ranging in height up to 30 feet or more. Crown spreading and with dense foliage. Trunk erect, columnar, from 6 to 12 inches in diameter, and undivided for two-fifths the entire height. Bark pinkish or pale brown, with short ridges and small lenticels. Leaves membranaceous, lanceolate. Flowers small, pale brown, in dense, rounded heads. Fruit black when mature, edible; February.—In dense forest (alt. 3,500 ft.).

Wood almost white or yellowish gray; odorless and tasteless; straight-grained; medium-textured; light in weight, but firm; easy to work and takes a fairly smooth polish; not durable. Growth rings absent or poorly defined. Parenchyma paratracheal, indistinct. Pores moderately small; numerous, uniformly scattered; solitary, also in radial, diagonal, or tangential multiples of 2, seldom in small clusters. Vessel lines appear as fairly long, fine scratches, of darker color than background; tyloses common. Rays fairly broad on cross section; distinct on all surfaces. Small radial canals present in the rays.

Vessel perforations simple. Rays 1–4 cells wide and 50 or more cells high.

San Martín: San Roque, *7225*.

MYRSINACEAE. Myrsine Family

Shrubs or small trees. Leaves alternate, entire or toothed, generally marked with translucent or dark glands or lines; stipules absent. Flowers small, white or pink, perfect, 4–5-parted, with inferior calyx. Fruit a small globose berry or drupe, commonly black or dark purple when ripe, edible. Timbers are used to a limited extent for construction, joinery, and fuel.

Wood dull grayish white to variegated pale pinkish brown, often with a grayish hue; heartwood sometimes well defined, darker brown, also with a grayish tinge. Wood odorless and tasteless; fine- or fairly fine-textured; of medium weight to rather heavy and tenacious; usually not difficult to work and takes a moderately lustrous polish; fairly durable to durable. Parenchyma rather sparingly developed about pores; not distinct with lens. Pores small to medium-sized; not numerous to numerous, usually well scattered; solitary, in small multiples or rows, seldom in small clusters; open or closed. Rays broad and distinct to indistinct on cross section, usually few and widely spaced; visible without lens in *Rapanea* on tangential and sometimes appear to constitute about one-third the area; often give a pronounced silver grain on radial surface, where they are darker than background and suggest sycamore (*Platanus*); aggregates of yellowish to dark brown ray cells or cysts are readily visible in some *Rapanea* species and impart a speckled appearance to rays on radial section.

The perforations of the vessels are chiefly simple; intervascular pits numerous, with ellipsoid margins and slit-like apertures. Rays distinctly heterogeneous; 2–6 cells wide and often very high, cells usually elongated vertically. Wood fibers have simple pits. The family resembles the Dilleniaceae and Proteaceae in some respects, but it differs from the dillenias in the size of the pores and their arrangement in radial multiples or rows, the simple perforations of the vessel plates, the simple pitting of the wood fibers, and the presence of resin cysts or cells in the rays in *Rapanea*. In the Proteaceae the pores are in distinct tangential arrangement as if hanging from the parenchyma lines, the latter extending in hammock-like arrangement between the rays.

1. CONOMORPHA A. DC.

Conomorpha peruviana A. DC. Ann. Sci. Nat. II. 16: 92. 1841. *Urpai-micuna.*

Uncommon shrub, about 6 feet tall. Calyx greenish white with pinkish dots; corolla creamy white; flowering in May–June. Fruit brownish black.—Forming undergrowth in dense forest (alt. 500 ft.).

Wood pale pinkish brown; odorless and tasteless; fairly fine-textured; moderately heavy; not difficult to cut. Parenchyma paratracheal; indistinct with lens. Pores fairly small; moderately numerous, fairly well scattered; solitary, less frequently in radial multiples or rows of 2–3, seldom in small clusters; mostly open. Rays

few, widely spaced, rather broad, and fairly distinct on cross section; invisible without lens on tangential; conspicuous at times on radial surface.

Loreto: middle Nanay, *965*.

2. RAPANEA Aubl.

Shrubs or trees. Leaves entire. Flowers small, clustered in the leaf axils. Fruit dry or fleshy, 1-seeded.

Sapwood dull white to pinkish brown, often with a grayish tinge; heartwood darker brown. Wood odorless and tasteless; fine- or fairly fine-textured; of medium weight to fairly heavy, tenacious; not difficult to work and takes a fairly lustrous finish; moderately durable to durable. Parenchyma sparingly developed around the pores; indistinct even with lens. Pores small to medium-sized; moderately numerous to very numerous and well distributed or tending to ring-porous; in radial multiples or rows, less often solitary or in small clusters; often closed. Rays rather widely spaced and distinct on cross section; readily visible without lens on tangential; often conspicuous on radial surface. Aggregates of yellowish or dark brown, resinous cells often present and give a speckled appearance to rays on radial surface.

Vessels with simple perforations. Rays distinctly heterogeneous; mostly 4–6 cells wide and very high. Wood fibers with simple pits.

Rapanea chartacea Macbr. Candollea 5: 396. 1934.

Shrub, about 12 feet in height. Bark chocolate brown, fairly smooth or with few, coarse ridges. Flowers small, pale yellow; March–April.—Uncommon; in dense forest in humid loam.

Wood pale yellow or pinkish brown; of light or medium weight; wavy- or moderately straight-grained; medium- to rather coarse-textured; not easy to cut; strong and fairly durable. Growth rings poorly defined. Parenchyma in fine bands around pores. Pores small; not numerous, well scattered; solitary, in radial multiples of 2–3, also in small clusters; open or closed. Vessel lines visible to unaided eye, but not prominent. Rays lighter-colored than fibers, widely spaced, and at limit of vision on moistened cross section; indistinct on other surfaces. Pith brown.

Loreto: near Iquitos, *8059*.

Rapanea leuconeura (Mart.) Mez, Pflanzenr. IV. 236: 389. 1902.

Small or medium-sized tree, up to 45 feet in height. Crown spreading. Trunk straight, round, 7 inches or more in diameter, either branching from near the base or undivided up to 25 feet. Bark pinkish or dark brown, fairly smooth, and with small lenticels. Fruit small, round, red when mature; December–January.—Fairly common on the plain of Tarapoto and around Lamas (alt. 1,400–1,600 ft.); in sandy or heavy loam in secondary growth.

Sapwood well defined, variable from cream-colored to pinkish brown, with grayish or purplish markings of rays; heartwood pinkish brown. Wood has no distinctive odor or taste; light to moderately heavy; fairly straight-grained; easy to cut, takes a moderately smooth polish with an attractive figure, and holds its place well when finished. Growth rings absent. Parenchyma paratracheal; indistinct. Pores small; fairly numerous, well scattered; mostly in small radial multiples or rows, also solitary. Vessel lines fine and inconspicuous; sometimes filled with black gum. Rays lighter-colored than fibers, widely spaced, and faintly or readily discernible without lens on cross section; conspicuous on tangential and radial surfaces; scarlet globules of gum often present in cells and visible on cross and radial surfaces.

San Martín: Tarapoto, *5461;* Lamas, *6383.*

Rapanea Sprucei Mez, Pflanzenr. IV. 236: 388. 1902. *Camesito.*

Shrub or small tree, about 12 feet tall. Densely branched. Trunk straight, slender. Bark dark brown; inner bark reddish brown. Fruit round, red when mature, and borne in clusters; December–January.—Uncommon; in sandy loam among small trees and shrubs (alt. 1,500 ft.). Timber is used for house construction and the leaves and bark are employed in domestic medicine.

Wood pinkish brown with darker brown markings of rays; wavy-grained; uniformly fine-textured; very hard, heavy, and extremely tenacious; not easy to cut and takes a smooth polish; very durable.

San Martín: near Tarapoto, *5977.*

3. STYLOGYNE DC.

Stylogyne amplifolia Macbr. Field Mus. Bot. 11: 33. 1931. *Puca-varilla.*

Small tree, from 12 to 22 feet in height, with dense, open crown. Trunk bent, round, slender, and unbranched for from 3 to 9 feet.

Bark reddish brown, smooth, scaly, or with low, rounded ridges. Flowers small, white. Fruit small, round, attached to branches, black when mature, and edible; June–July.—Not very common; in dry or humid loam in fairly dense forest (alt. 380 ft.).

Sapwood variable in color from yellowish to pale pinkish brown; heartwood reddish brown, thin. Wood odorless and tasteless; straight- or wavy-grained; medium- to fairly coarse-textured; of fairly light or medium weight; not difficult to cut and takes a smooth finish. Growth rings absent or poorly defined. Parenchyma indistinct. Pores minute or small and barely discernible with lens; not numerous, well scattered; solitary or in radial or diagonal pairs. Vessel lines fine and barely distinguishable without lens. Rays lighter-colored than fibers, widely spaced, and faintly discernible or readily distinguishable to unaided eye on moistened cross section; indistinct on tangential; darker than background in some specimens and conspicuous on radial surface.

Loreto: lower Nanay, *587;* Caballo-cocha, *2081*, *2117*.

THEOPHRASTACEAE. Theophrasta Family

1. CLAVIJA Ruiz & Pavón

Clavija sp. *Trompetero-sacha.* Shrub, up to 16 feet in height. Crown dense. Trunk stout and branching from base. Bark light or dark brown, coarsely wrinkled. Flowers yellow; September–October.—Fairly abundant in some localities in the lowland (alt. 500 ft.); in dry loam in thickets or along margin of forest.

Wood creamy yellow when fresh, with pinkish, pale purple, or gray streaks when dry; odorless and tasteless; fine-textured; fairly light; easy to cut; not durable. Parenchyma indistinct. Pores small; fairly numerous; predominantly solitary; open or closed. Rays conspicuous on all surfaces.

Vessels with simple perforations; intervascular pits numerous, small. Rays heterogeneous and tending to homogeneous; up to 10 cells or more wide and 60 cells high. Wood fibers fairly thick-walled.

Loreto: lower Huallaga, *4174*.

SAPOTACEAE. Sapodilla Family

Trees or large shrubs, sometimes armed with spines. Leaves alternate, entire, stalked, usually thick and leathery, without stipules, and frequently in tufts at the ends of the branches. Flowers small, whitish or greenish, perfect, in small clusters in the leaf axils

or on older naked branches. Fruit a fleshy drupe or berry, often very large, succulent, and edible, the trees sometimes cultivated on this account; seeds 1 to several and in some species are sources of food and oil. The family is characterized by a milky juice, the source of such commodities as balata, chicle, and gutta-percha, products which are of greater economic importance than their timbers. Some of the timbers, *Manilkara*, for example, are valuable on account of their hardness, strength, and durability, adapting them to a wide range of uses.

Woods pinkish, yellowish, or reddish brown, often with a gray tinge; heartwood sometimes well defined, dark chocolate brown; odorless and tasteless; fairly fine- to coarse-textured; mostly heavy or very heavy; capable of taking a smooth polish with a moderate or high luster. Parenchyma in numerous, fine, often wavy, tangential or concentric lines or bands, forming a network with the rays. Pores fairly small to large; rather few to numerous and well scattered; most often in radial multiples, also solitary, in radial rows, or in clusters; open or closed. Rays very fine or fine, usually thinner than parenchyma lines, numerous, and sometimes indistinct on cross section; not visible without lens on other surfaces.

Vessel perforations exclusively simple in the Peruvian species, in others scalariform, simple, or both; vessel-ray pits large, elliptical or much elongated, simple or half-bordered. Rays heterogeneous; uniseriate and partly biseriate in *Lucuma* and *Manilkara*, 2–3 cells wide in *Sideroxylon*. Rhombohedral crystals of calcium oxalate and dark gum common. Wood fibers often exceedingly thick-walled and with small lumina; pits simple.

1. CHRYSOPHYLLUM L.

Large or medium-sized trees with milky latex, easily recognized by their oblong to oval, leathery leaves, which are rather small, glabrous on the upper surface, and densely covered beneath with closely appressed, brownish, glistening hairs. Flowers small or very small, stalked, clustered in the leaf axils or at naked nodes below the leaves; sepals 5–6; corolla 5–6-lobed; staminodia none. Fruit small or large, containing 1 or more seeds. Timber is used locally for heavy construction.

Wood pale pinkish brown and streaked with gray, becoming yellowish brown on exposure to air and sunlight; odorless and tasteless; moderately fine- to medium-textured; heavy and durable; occasionally saws slightly woolly, takes a moderately lustrous polish.

The structure suggests that of *Lucuma*. Parenchyma in numerous, fine, tangential lines or concentric bands. Pores moderately small; few or moderately few, uniformly distributed; mostly in radial multiples, less often solitary or in clusters; open or closed. Rays fine, numerous, and rather unevenly spaced on cross section; invisible without lens on all surfaces.

Vessel perforations simple. Rays heterogeneous; mostly 1–3 cells wide.

Chrysophyllum Klugii Baehni, ined. *Balata blanca de altura*.

Forest tree, up to 150 feet in height. Crown flat or spreading. Trunk fairly straight, cylindrical, 36 inches in diameter, and undivided for 80 feet. Bark dark reddish or chocolate brown, with numerous small scales or small fissures. Flowers pale yellow, small; May–June. Fruit yellowish brown when mature, with persistent calyx lobes and containing a cream-colored, edible pulp in which are imbedded 1 or 2 lustrous black seeds.—Not common; forming the upper story in dense forest not subject to seasonal floods (alt. 500 ft.).

Sapwood fairly well demarcated, uniform pale brown and darkening on exposure; heartwood dark reddish brown, thin. Wood has no distinctive odor or taste; straight-grained; medium- or rather coarse-textured; fairly heavy and strong; not very easy to work and takes a smooth finish; liable to check in drying; durable. Growth rings present owing to some variation in depth of color. Parenchyma in fine, wavy, evenly spaced, continuous, concentric lines, lighter-colored than adjacent elements. Pores at limit of vision; not very numerous, uniformly scattered; in radial multiples of up to 7 or more, infrequently solitary; open. Vessel lines visible without lens, but not distinct; grayish deposit of calcium common. Rays numerous, fine, and visible only with lens on cross and tangential sections; slightly darker brown than adjacent elements and distinguishable without lens on moistened radial surface. The structure of the wood, especially the arrangement of the parenchyma, suggests *Lucuma*.

Loreto: upper Nanay, *911*.

Chrysophyllum sericeum A. DC. Prodr. 8: 158. 1844.

Tall shrub or small tree, up to 15 feet in height. Crown spreading. Trunk straight, round, slender, and free of branches for 6 feet. Bark dark brown, with short, fine fissures. Flowers pale yellow; October–November.—Common along the banks of the Paranapura River, an affluent of the Huallaga (alt. 500 ft.); in dense forest. Timber is not used locally except for fuel.

Wood light brown, often with broad, dark grayish areas, and with little or no definition between sap and heart; tasteless and odorless; interlocked-grained; uniformly fine-textured; hard, heavy, and strong; not easy to work and holds its place well when finished; durable. Growth rings occasionally present owing to variation in abundance of parenchyma. Parenchyma in numerous, fine, concentric lines forming a network with rays. Pores small and distinguishable only with lens; rather few, well scattered; solitary or in radial multiples of 2–3 or more. Vessel lines exceedingly fine and indistinguishable to unaided eye. Rays discernible only with lens on cross section; barely visible without lens on other surfaces.

Loreto: lower Huallaga, *3945*.

Other numbers determined provisionally as *Chrysophyllum:*

San Martín: Tarapoto, *5522, 6140*.

2. LUCUMA Molina

Small or large trees with milky latex. Leaves small or large, leathery or rather thin, glabrous. Flowers small or large, greenish, stalked, solitary or clustered in the leaf axils; sepals 4–6; corolla 4–5-lobed, without appendages; stamens 4–5, alternating with the staminodia. The fleshy, olive-like fruit is small or large, usually edible, and contains 1–5 seeds. The durable timber is employed mostly for house timbers.

Sapwood yellowish or pinkish brown, darkening on exposure; heartwood chocolate brown with a grayish cast. Wood odorless and tasteless; medium- to coarse-textured; of medium density to very heavy; occasionally saws woolly, not difficult to work, and sometimes takes a lustrous polish; subject to stain and insects. Parenchyma in few to fairly numerous, tangential lines or fine, continuous, concentric bands, sometimes wavy and uniting the pores. Pores of medium size to moderately large; fairly numerous to numerous and well scattered; mostly in radial multiples, less often solitary, in radial rows, or in clusters; open or filled with dark gum or tyloses. Rays numerous on cross section and much finer than parenchyma lines or bands; invisible to unaided eye on all surfaces.

Vessel perforations simple. Rays heterogeneous; uniseriate or partly biseriate.

Lucuma bifera Molina(?), Sagg. Stor. Nat. Chil. 187. 1782. *Pucuna-caspi, Urcu-cumala.*

Tree, up to 90 feet in height. Crown spreading or conical; branches elongated. Trunk erect, cylindrical, about 20 inches in diameter, and unbranched for about three-fourths the entire height. Bark reddish to dark brown or almost black, with long, shallow fissures, and secretes when cut a small amount of dark red resin. Flowers axillary, fairly large, red; May–June. Fruit dehiscent; seeds ovoid, reddish.—Uncommon; in dense forest free from floods (alt. 450 ft.). The durable heartwood is sometimes used for making blowpipes, hence the local Quechua name ("pucuna"=blowpipe; "caspi"=wood).

Sapwood well demarcated, pale lustrous brown; heartwood dark purplish or chocolate brown. Wood odorless and tasteless; straight-grained; uniformly fine-textured; rather heavy, firm, strong, and compact; easy to cut and takes a smooth finish; durable. Growth rings faintly visible. Parenchyma in fine, wavy, unevenly spaced, concentric lines. Pores sometimes faintly visible without lens. Vessel lines short or long; often filled with lustrous tyloses. Rays distinguishable on radial surface.

Loreto: upper Nanay, *902*.

Lucuma Caimito (Ruiz & Pavón) Roem. & Schultes, Syst. Veg. 4: 701. 1819. *Caimito*.

Tree, from 20 to 45 feet in height, infrequently attaining greater stature. Crown conical or wide-spreading. Trunk straight, round or fairly so, from 6 to 15 inches in diameter, and undivided for from 2 to 20 feet. Bark 0.5 inch thick, pale or dark reddish brown, scaly, and with very coarse, broad fissures. Flowers small, white; June–July. Fruit ovoid, yellowish white when ripe, edible and highly esteemed; October–December.—Widely distributed throughout the lowland and frequently cultivated for its fruit; in open dry loam. Timber is used to a limited extent for general carpentry.

Sapwood pinkish or light brown, darkening on exposure and with a grayish cast; heartwood dark brown, perishable. Wood odorless and tasteless; straight- or irregular-grained; medium-textured; moderately heavy to heavy, firm, and strong; fairly easy to cut; liable to check and susceptible to stain in drying. Growth rings visible owing to variation in abundance of elements. Parenchyma in numerous, evenly and closely spaced, wavy, concentric lines or fine bands forming a network with the rays. Pores of medium size; fairly numerous, well distributed; in radial multiples or rows of 2–6, less frequently solitary; open. Vessel lines distinguishable without

lens, but not prominent; grayish white deposit frequently present. Rays indistinct to unaided eye on cross and tangential sections; occasionally visible without lens on radial surface.

Loreto: lower Itaya, *171*(?); lower Nanay, *472;* Pebas, *1792, 1983;* La Victoria, *2683;* lower Huallaga, *3990, 4717.*

Lucuma dolichophylla Standl., ined. *Quina-quina, Quinilla blanca.*

Tree, from 45 to 70 feet tall. Crown round or flat. Trunk straight, cylindrical or moderately so, from 8 to 20 inches in diameter, and undivided for from 12 to 35 feet. Bark dark purplish brown and when cut yields a fairly sweet latex resembling gutta-percha; inner bark coarsely fibrous. Flowers small, white. Fruit round, covered with a brown, velvety down, yellow when mature, and edible; November.—Not common; in dense forest free from floods (alt. 600 ft.). The durable heartwood is esteemed for house construction and general carpentry.

Sapwood uniform light brown, darkening somewhat on exposure; heartwood brown. Wood rather heavy and strong; saws slightly woolly; liable to check in drying. Pores not numerous, uniformly scattered; mostly in radial multiples or rows of 2–4, also solitary; open or closed. Rays occasionally distinguishable without lens on radial surface.

Loreto: upper Nanay, *886;* Santa Rosa, lower Huallaga, *4951.*

Lucuma huallagae Standl., ined. *Huangana-caspi.*

Tree, about 30 feet in height. Crown spreading. Trunk moderately straight, cylindrical, slender, and undivided for 12 feet. Bark about 0.5 inch thick, dark brown, fairly smooth, and secretes a small quantity of sweet latex. Fruit grayish brown with a velvety down, and borne on the main branches; October–November.—Uncommon; in dense forest not subject to periodical floods (alt. 600 ft.). The dense, hard wood is esteemed for house posts.

Wood pinkish or yellowish brown throughout; heavy, compact, strong, and tenacious; straight- or interlocked-grained; rather fine-textured; moderately easy to work and takes a smooth finish. Growth rings present. Pores often filled with pale yellowish white deposit. Rays invisible to unaided eye on all surfaces.

Loreto: Yurimaguas, *4802.*

The following numbers remain to be determined specifically:

Loreto: lower Itaya, *189;* upper Nanay, *899;* Puerto Arturo, lower Huallaga, *5358.*

3. **MANILKARA** Adans.

Tall, evergreen trees or rarely shrubs. Leaves alternate, entire, leathery; stipules small. Flowers whitish, clustered in the leaf axils. Fruit obovoid or ellipsoid, 1–2-seeded.

This genus is important commercially as the source of balata, a hydrocarbon similar to gutta-percha and the only substance so far known that may be substituted for this commodity in all its applications. The milky latex that issues immediately and abundantly from the incised bark of the "balata" tree (known in English as "bully" or "bullet tree") solidifies on contact with the air and assumes a pinkish tint. It contains from 42 to 48 per cent of gutta and from 37 to 44 per cent of resins. The yield of a single tree during one collecting season varies greatly, but may average about 5 or 6 pounds. Coagulation is obtained by exposure to the air or by boiling. (For further notes on balata in the montaña, see page 50.)

Sapwood varies in color from pale pinkish or yellowish to reddish brown; heartwood darker brown, not always sharply defined. Wood odorless and tasteless; medium- or rather fine-textured; heavy or moderately heavy, hard, strong, and durable; takes a smooth, fairly lustrous polish. Parenchyma in numerous, fine, closely but not always evenly spaced, wavy, concentric lines, sometimes broken and irregular, not always distinct without lens. Pores small or very small to medium-sized; in radial multiples or rows, less often solitary; mostly open. Rays very fine and numerous; visible with lens on cross section, but not on tangential; of about the same color as background or distinct, but not prominent, on radial.

Vessel perforations simple; vessel-ray pits large, elliptical or elongated, simple to half-bordered. Rays heterogeneous; 1–3 cells wide and few to many cells high, often filled with dark gum. Wood fibers extremely thick-walled with minute cavities and small, simple pits. Crystals of calcium oxalate common in parenchyma and rays.

Manilkara bidentata (A. DC.) A. Chev. Revue de Botanique Appliquée et d'Agriculture Tropicale 12: 268–270, *pl. 8.* 1932. *Pamashto, Quinilla, Quinilla colorada.*

Tree, up to 75 or 85 feet in height. Crown wide-spreading, flat, or conical. Trunk straight or moderately so, cylindrical, up to 18 inches in diameter, and clear of branches for from 50 to 65 feet or more. Bark 0.5 inch or more thick, pale gray or pinkish to dark reddish brown, with coarse, deep, vertical fissures, and yields a copious quantity of slightly sweet, viscid, yellow latex—the balata

of commerce. Leaves dark green and about 6 inches long. Flowers small, yellow. Fruit borne in profusion, round, red, and edible when mature; seeds small, lustrous black; January through April. —Widely scattered but nowhere abundant; in dry or slightly humid loam in dense forest (alt. 380–1,400 ft.). The dense, durable heartwood is highly esteemed for house posts, general construction, and sometimes for canoes.

Sapwood yellowish white, darkening on exposure to a uniform pale pinkish brown; heartwood reddish brown. Wood odorless and tasteless; straight- or interlocked-grained; fine- or medium-textured; heavy, hard, compact, and very strong; not easy to work and takes a smooth, fairly lustrous finish; likely to check in drying. Growth rings present owing to darker zones free from parenchyma. Parenchyma in numerous, fine, continuous or broken and irregular, concentric lines; visible only with lens. Pores mostly small; not numerous, well distributed; mostly in radial multiples of 2–5, also solitary or in small clusters; open or closed. Vessel lines appear as fine or distinct, but not conspicuous, scratches of lighter color than background; filled with black gum or tyloses. Rays fine, numerous, slightly thinner than parenchyma lines, visible only with lens on cross section; indistinct on tangential; lighter-colored than background on radial surface and faintly discernible to aided eye.

Loreto: upper Nanay, *893*, *907;* Caballo-cocha, *2260.*—San Martín: Tarapoto, *5735.*

4. SIDEROXYLON L.

Medium-sized or large trees. Leaves of small or medium size, rather leathery, with short or long petioles. Flowers small, in dense clusters in the leaf axils or on naked branches; sepals usually 5, subequal; corolla most often 5-lobed. Fruit small, commonly 1-seeded. Timber is suitable for heavy construction.

Wood of various shades of brown, ranging from pale pinkish to reddish and often with a grayish hue; odorless and tasteless; moderately fine- to medium-, infrequently coarse-textured; fairly light to rather heavy and durable; sometimes saws woolly, easy to work, and capable of taking a lustrous polish. Parenchyma in evenly spaced, concentric lines, at times wavy, not always visible with lens. Pores fairly small to large; few to fairly numerous, well distributed; solitary or in radial multiples, less often in radial rows or in clusters; open or closed. Rays fairly fine to invisible on cross section; not visible on tangential; rather distinct on radial surface.

Vessels with simple perforations; vessel-ray pits large, elliptical or much elongated vertically or laterally. Rays heterogeneous; mostly 2–3 cells wide. Wood fibers with very thick walls and minute cavities; pits simple. Rhombohedral crystals of calcium oxalate common in parenchyma strands.

Sideroxylon cylindrocarpon Poepp. & Endl. Nov. Gen. & Sp. 3: 72. *pl. 282.* 1845.

Shrub, 18 feet tall, with slender trunk, branching 7 or 8 feet from the base. Bark rufous brown, very thin, and scaly. Fruit round, black, 2-seeded.—Not common; in dry loam along margin of forest (alt. 400 ft.).

Wood uniform pale pinkish brown with a pale grayish tinge and turning to yellowish or pale brown on exposure; odorless and tasteless; interwoven-grained; uniformly fine-textured; of medium weight; not easy to cut, takes a smooth polish with a moderate luster, and holds its place well when finished; durable. Growth rings absent or poorly defined. Parenchyma in very fine, evenly spaced, concentric lines. Pores minute or small; few and scattered; solitary or in small radial rows or multiples. Vessel lines very fine or sometimes visible without lens. Rays moderately fine and slightly wavy on cross section; discernible to aided eye on moistened cross and tangential surfaces; slightly darker than adjoining elements and faintly distinguishable without lens on radial.

Loreto: La Victoria, *2995*.

Sideroxylon Quinilla Standl., ined. *Quinilla.*

Tall, forest tree, up to 100 feet or more in height. Crown spreading. Trunk fairly straight, compressed or fluted, up to 45 inches in diameter, unbranched for 30 feet, and with large surface roots. Bark thin, reddish brown, fairly smooth, and yields when incised a small amount of insipid latex. Fruit ellipsoid, green when mature; September–October.—Uncommon; in flood-free areas (alt. 500 ft.). Timber is used for general construction.

Wood pale brown throughout; odorless and tasteless; straight- or moderately straight-grained; medium-textured; of medium weight; not difficult to work and holds its place well when finished; durable. Growth rings present, but poorly defined. Parenchyma invisible or faintly visible with lens as fine, broken or fairly continuous, concentric lines. Pores of rather small or medium size; fairly numerous and well scattered; in radial rows or multiples of 2–5, less frequently solitary; open or filled with white deposit. Vessel lines of same color

as background or at limit of vision. Rays very fine and barely visible with lens on moistened cross section; indistinct on tangential; faintly discernible to aided eye on radial surface.

Loreto: Sapote-yaco, lower Huallaga, *4903*.

Sideroxylon Ulei Krause, Verh. Bot. Ver. Brandenb. 50: 95. 1908. *Varilla del agua.*

Shrub or small tree, from 12 to 18 feet in height. Bark light gray, dark brown, or almost black, with small lenticels. Leaves leathery. Fruit ellipsoid, brown, 1-seeded.—Common along the banks of the Morona River, an affluent of the Nanay (alt. 400 ft.).

Wood light pink or pale yellow throughout; odorless, but slightly bitter; moderately straight-grained; fine-textured; rather tenacious. Growth rings present. Parenchyma in fine, concentric lines; visible only with lens. Pores small; few and well scattered; in radial or diagonal multiples or rows of 2–5, less frequently in tangential pairs or solitary. Vessel lines fine, but faintly discernible without lens. Rays very fine and barely distinguishable with lens on cross section; invisible on other surfaces.

Loreto: near Iquitos, *191*.

Sideroxylon Williamsii Baehni, ined. *Tarrico-nana.*

Forest tree, 50 feet tall. Crown spreading. Trunk straight, round, 12 inches or so in diameter, and unbranched for 10 feet. Bark dark reddish or chocolate brown, scaly, and secretes when cut an abundance of pale pinkish latex which has a slightly bitter taste. Flowers axillary, small, yellow; July. Fruit round, yellow and soft when mature.—Uncommon; in alluvial loam in forest (alt. 500 ft.).

Wood light brown with scattered patches of pale grayish white and fine, dark, irregular striping; odorless and tasteless; irregular-grained; medium-textured; of medium weight to fairly heavy and tough; not difficult to work and takes a smooth finish; appears to be durable. Growth rings present, but not well defined. Parenchyma in fine, evenly spaced, concentric lines; visible only with lens. Pores of medium size; rather numerous and well distributed; solitary or in radial multiples or rows of up to 7 or more; open or closed. Vessel lines appear as very fine scratches of darker color than background; dark gum, calcium, or lustrous tyloses common. Rays fine or barely visible with lens on cross section; numerous and of a dark reddish color on tangential; sometimes dsicernible with lens on radial surface. Abundant deposit of calcium (raphides) discernible in pith.

Loreto: Palta-cocha, middle Nanay, *3198*.

EBENACEAE. Ebony Family

1. DIOSPYROS L.

Trees or large shrubs. Leaves alternate, entire, persistent or deciduous, without stipules. Flowers small, of 2 sexes, white or greenish, axillary, solitary or in cymes; corolla of united petals. Fruit baccate, usually large, containing several large seeds. Some members of the genus are cultivated for their edible fruits, others are commercially important as the source of the true ebony of commerce, which comes from Africa and the Far East.

The Peruvian woods are yellowish, grayish, or light brown to dark purplish brown, usually streaked; fine- or medium-textured; heavy or moderately so, tenacious, and strong; easy to work and capable of taking a smooth polish; sapwood suitable for tool handles, heartwood for small cabinet work and articles of turnery. Parenchyma in numerous, very fine, closely spaced, concentric lines forming a network with the rays and suggesting certain representatives of the Anonaceae; invisible without lens and sometimes, particularly in the black heartwood, not distinct under lens. Pores usually very small; few or fairly numerous; solitary or infrequently in small multiples; open. Rays very fine; indistinct or not visible with lens.

Vessels have simple perforations; vessel-ray and vessel-parenchyma pits half-bordered or bordered. Rays heterogeneous; uniseriate or at the most triseriate.

Diospyros peruviana Hiern, Trans. Camb. Phil. Soc. 12: 253. 1873.

Tall shrub or small, slender tree, sometimes up to 21 feet in height. Crown spreading or flat. Trunk erect, cylindrical, slender, and clear of limbs for three-fourths the height. Bark rather thin, pale brown, with long, coarse fissures; inner bark separates into thin flakes. Leaves oblong, acuminate at apex, subrounded or narrow at base, coriaceous, deep green, shining, glabrescent above except along the depressed veins, pubescent beneath especially along the veins. Inflorescence cymose; calyx densely pubescent outside and slightly so inside; corolla lobes rounded and wide-spreading in flower. Fruit subglobose, yellow when mature; December–January. —In sandy loam among shrubs or small trees (alt. 400–1,400 ft.).

Sapwood fairly well demarcated, pale brown interspersed with streaks of gray; heartwood dark gray. Wood straight-grained; uniformly fine-textured; moderately light in weight, compact, tough; fairly easy to work and takes a smooth finish. Growth rings occasion-

ally present owing to variation in depth of color. Parenchyma faintly discernible as fine, broken, concentric lines. Pores of small to medium size; not numerous, uniformly scattered; solitary or in radial multiples of 2–3; mostly open. Vessel lines very fine and barely distinguishable with lens, sinuous, and evenly spaced on cross section; at limit of vision, but not prominent, on tangential and radial surfaces.

San Martín: Tarapoto, *6498*.—Loreto: lower Itaya, *8130*.

Diospyros Poeppigiana A. DC. Prodr. 8: 224. 1844. *Uchpa-pamashto*.

Tree, about 40 feet tall. Crown irregular. Trunk cylindrical, erect, 20 inches in diameter, and clear of limbs for 10 feet. Bark up to 0.75 inch thick, dark brown or black; inner bark reddish brown. Flowers yellow. Fruit about 1 inch in diameter, brown when mature, and with 4 seeds imbedded in a sweet, edible pulp; July–August.—Fairly abundant, but not widely distributed; in dry medium loam in dense forest (alt. 380 ft.). Wood is used mostly for fuel.

Wood dark purplish brown throughout and darkening somewhat upon exposure to air; softer and coarser-textured than *C. peruviana*.

Loreto: La Victoria, *3196*.

LOGANIACEAE. Strychnine Family

Herbs, vines, shrubs, or trees. Leaves opposite or whorled, entire, dentate, or lobed, with or without stipules. Flowers regular, large or small; calyx 4–5-lobed; corolla of 4 or 5 united petals. Fruit a capsule, drupe, or berry, 1- or many-seeded. Their timbers are of no local economic importance. From Old World species of the genus *Strychnos* are obtained the drugs strychnine and nux vomica.

Woods yellowish or pale pinkish brown, with a grayish tinge; fine-textured; of light to medium weight; easy to cut. Parenchyma in numerous, closely spaced, concentric lines or fine bands. Pores minute or very small; numerous or fairly numerous and well scattered; predominantly solitary, infrequently in small multiples; open or closed. Rays very fine and usually invisible without lens on all surfaces. The woods are of interest because of the presence of island type of included phloem in several species of *Strychnos*, which provides an important diagnostic feature.

Vessel perforations exclusively simple; intervascular pits small, with slit-like apertures; vessel-ray pits large and elongated, simple or half-bordered. Rays heterogeneous; mostly uniseriate or partly biseriate.

1. POTALIA Aubl.

Potalia amara Aubl. Pl. Guian. 1: 394. *pl. 151.* 1775. *Sachamangua.*

Erect, slender shrub, from 5 to 15 feet tall, with flat top and simple trunk. Twigs glabrous. Bark grayish or pale green, fairly smooth. Leaves lanceolate, short-stalked, entire, midrib prominent beneath, acuminate at apex, narrowing to the base, and confined to the summit. Corolla yellowish white; flowering in September–October. Fruit a round or ovoid, pale green, ruminate berry; seeds globose; January.—Common in both lowland and upland (alt. 380–3,500 ft.); in clearings or along margin of forest.

Wood pale yellow with pinkish or grayish streaks; straight-grained; uniformly fine-textured. Growth rings present, but poorly defined. Parenchyma in numerous, fine, wavy, closely spaced, concentric lines or fine bands. Vessel lines at times barely visible with lens. Rays numerous and finer than parenchyma lines on cross section; indistinct on other surfaces.

Loreto: Pebas, *1936;* herbarium material collected also in the lower Huallaga, Department of Loreto, and at San Roque, Department of San Martín.

2. STRYCHNOS L.

Trees or scandent shrubs, of wide distribution in the tropics, particularly in Asia and Africa. Leaves opposite, entire, one of them being frequently abortive and developing from its axil a tendril-like branch. Flowers small, white, greenish white, or yellowish, in terminal or lateral cymes; calyx 4–5-lobed, corolla salverform, 4–5-cleft, stamens 5. Fruit a globose or oblong berry. The genus is of economic value as the source of drugs.

The fruit of the strychnine tree (*S. Nux-vomica* L.), of tropical India, contains numerous, flattened seeds imbedded in pulp. The seeds are intensely bitter, owing to the presence of the alkaloids strychnine and brucine, but the pulp is said to be innocuous. *S. toxifera* Schomb., of Panama and South America, supplies an ingredient of the drug "curare," employed by the aborigines for poisoning arrows.

Strychnos Poeppigii Prog. in Mart. Fl. Bras. 6, pt. 1: 282. 1868. *Cunshu-huayo.*

Uncommon tree, about 20 feet in height. Crown flat. Trunk straight, round, and slender. Bark yellowish or reddish brown,

very thin, and scaly. Leaves opposite, entire, glabrous, and veins prominent beneath. Fruit a round, light to dark brown, 1-seeded berry; seeds white, discoid; April–May.—In dense forest among tall trees (alt. 450 ft.).

Sapwood dark violet or pale brown, becoming light brown when exposed to air and often with a grayish cast; heartwood dark brown, thin. Wood odorless and tasteless; straight-grained; medium-textured; rather heavy, strong, and fairly tough; not difficult to work and takes a dull finish; probably durable. Growth rings present, but poorly defined. Parenchyma paratracheal and in short, tangential bands uniting the pores, occasionally in broken, concentric bands; visible only with lens. Pores small; fairly numerous to numerous and well scattered; solitary or less frequently in small radial multiples. Strands of included phloem—characteristic of woods of this genus—are prominent on cross section and visible also on radial surface. Vessel lines very fine and indistinct. Rays very fine; barely discernible without lens on cross and radial sections; indistinct on tangential.

Loreto: lower Nanay, *597*.

APOCYNACEAE. Dogbane Family

Large family composed of trees and shrubs, sometimes herbs, often scandent, with milky sap. Leaves entire, opposite, whorled, or alternate, without stipules. Flowers mostly in terminal or lateral cymes, large and showy or small, perfect, and regular; calyx 5-lobed, corolla 5-lobed, stamens 5, with short filaments. Fruit composed of 1 or 2 carpels, these dry or fleshy, dehiscent or indehiscent. Most of the plants have a milky sap furnishing such useful products as landolphia rubber (*Landolphia Kirkii* Dyer, *L. owariensis* Beauv., etc.) and silk rubber (*Funtumia elastica* Stapf.) of tropical Africa. Only a limited number of the members are important for their timber.

Woods yellowish, grayish, to pinkish or chocolate brown; most often without distinctive odor or taste; medium- to coarse-textured; moderately heavy; easy to work and capable of taking a smooth, sometimes lustrous finish. Parenchyma may be scantily developed or moderately abundant; most often in fine lines extending between the rays, seldom in concentric bands. Pores of medium size to large; fairly numerous to numerous, well distributed; solitary, in multiples or rows, or in clusters; open or closed. Rays fine on cross section; usually invisible without lens on tangential and radial surfaces.

Latex tubes are present in the rays in some species and form one of the most important anatomical characters of the family. Large radial canals are present in the majority of the Peruvian genera described below.

Vessels with simple perforations; vessel-ray pits bordered. Rays heterogeneous; uniseriate or multiseriate (mostly 2–3 cells wide) and up to 15 cells or more high.

1. ASPIDOSPERMA Mart. & Zucc.

Aspidosperma subincanum Mart. Herb. Fl. Bras. No. 262. 1837–40; DC. Prodr. 8: 397. 1844. *Quillo-bordón, Pinshi-caspi.*

Medium-sized to tall, forest tree, from 75 to 120 feet in height. Crown flat. Trunk straight, columnar, and slender. Bark grayish to dark reddish brown, scaly. Leaves oblong or ovate-oblong, membranaceous. Flowers small, numerous; calyx lobes lanceolate. —Not common; in dense growth in the region of Tarapoto and Río Mayo (alt. 1,300–1,600 ft.). Timber is highly esteemed for general carpentry and to a small extent for furniture.

Sapwood yellowish or dull brown, sometimes with a grayish cast; heartwood dark brown. Wood has a slightly fragrant odor when fresh, but no characteristic taste; straight-grained; fine-textured; fairly heavy to heavy and strong; not very easy to work and capable of taking a high polish; durable. Growth rings poorly defined or sometimes present owing to absence of pores. Parenchyma in indistinct, concentric bands. Pores of small to medium size; numerous, sometimes tending to crowd; solitary or less often in radial multiples of 2; open. Vessel lines fine and of same color as background. Rays numerous, fine, and lighter-colored than the surrounding elements on cross section; indistinct on tangential and radial. Large radial canals present.

San Martín: Río Mayo, *6231;* Tarapoto, *5754*(?).—Loreto: Yurimaguas, *4204*(?).

2. CONDYLOCARPON Desf.

Condylocarpon pubiflorum (Benth.) Muell. Arg. in Mart. Fl. Bras. 6, pt. 1: 67. 1860.

Small tree, rarely attaining a height of more than 25 feet. Crown spreading. Trunk straight, columnar, slender, and clear of limbs up to one-fourth the height. Bark dark reddish brown, with small scales; inner bark fibrous. Leaves opposite, ovate-elliptic, thin, often shiny, and glabrous above. Flowers minute, in terminal

cymes. Fruit compressed, woody.—Not common; in secondary growth (alt. 350 ft.).

Wood pale yellow or light brown throughout, often streaked with pink or dark gray, and darkening slightly upon exposure; odorless and tasteless; straight- or interwoven-grained; medium-textured; heavy, strong, and tenacious; saws woolly; appears to be durable, though liable to stain and check in drying. Growth rings occasionally present owing to slight variation in depth of color. Parenchyma in broad, distinct, continuous, concentric bands, several times thicker than rays and of lighter color than background; distinguishable also on tangential. Pores at limit of vision; rather few to fairly numerous, scattered; solitary or in radial multiples of 2–4, seldom in small clusters; infrequently filled with dark gum or whitish deposit. Vessel lines rather coarse. Rays fine; indistinct without lens on all surfaces.

Loreto: Caballo-cocha, *2011*.

3. COUMA Aubl.

Large trees, with verticillate or opposite leaves. Inflorescence axillary, near the tips of twigs; corolla small, pink or purple. Fruit a globose berry, with several ellipsoidal seeds.

Sapwood oatmeal-colored or pale yellow to pinkish brown; heartwood sometimes well defined, pale reddish brown. Wood has no characteristic odor or taste; medium- to rather coarse-textured; light in weight; fairly lustrous in proper light; subject to stain and not durable. Parenchyma in fine lines extending between the rays. Pores of medium size to fairly large; moderately numerous, scattered; solitary or more frequently in radial multiples; open or filled with calcium. Rays fine; visible only with lens on all surfaces. Large radial canals present.

Couma sp. *Leche-caspi*. Tall, umbrageous tree, up to 150 feet in height. Crown flat or open. Trunk erect, cylindrical, up to 36 inches in diameter, and free of branches for three-fourths the height. Bark chocolate brown, thin, with smooth scales, and exudes when cut a copious quantity of sweet latex employed locally for calking canoes.—Fairly common; in intermediate or flood-free forest (alt. 450 ft. or more).

Sapwood sharply defined, oatmeal-colored or pale yellow, occasionally with dark streaks; heartwood dark pinkish brown, thin. Wood straight-grained; medium- to coarse-textured; easy to cut.

Growth rings absent or poorly defined. Parenchyma abundantly developed. Pores not visible without lens or at limit of vision; in radial multiples of 2–9, less frequently solitary or in small clusters; tyloses, dark gum, or white deposit sometimes present. Vessel lines rather coarse and short. Rays visible only with lens on all surfaces.

Loreto: upper Nanay, *912*.

Couma sp. *Leche-caspi, Osurba.* Glabrous tree, from 80 to 140 feet tall. Crown spreading. Trunk moderately straight, round, approximately 36 inches in diameter, and free of branches for more than half the height. Bark light brown, sculptured, and secretes when cut an abundance of latex, known locally as *fansoca*, used for calking canoes and river launches, and occasionally in varnishes. Flowers reddish white; May–June. Fruit round, small.—Fairly common; in flood-free forest (alt. 350 ft.).

Wood pinkish brown throughout; harder and more compact than *No. 912*. Pores few; mostly in radial multiples of 2–4, occasionally solitary. Rays at limit of vision, but not conspicuous, on radial surface.

Loreto: Caballo-cocha, *2100*.

4. ECHITES Jacq.

Echites spectabilis Stadelm. Flora 24, pt. 1: Beibl. 44. 1841.

Scandent shrub. Leaves large, opposite, and leathery. Bark chocolate brown, laminated. Flowers white and showy, in axillary cymes. Fruit a follicle; seeds spindle-shaped, with an apical tuft of brown hair. The stem yields a large quantity of sap.—In dry or wet thickets (alt. 350–450 ft.).

Loreto: lower Nanay, *711*.

5. MACOUBEA Aubl.

Macoubea paucifolia (Spreng.) Markgr., ined. *Chicle, Huapa-caspi, Yaco-sanango.*

Forest tree, up to 75 feet or more in height. Crown spreading or flat; branches elongated and undulating. Trunk fairly straight, cylindrical, up to 36 inches in diameter, and clear of branches for about half the entire height. Bark 0.75 inch thick, deep pink or dark brown, rough, and exudes an abundance of sweet latex, hence the local name "chicle." Flowers fairly large, white, with long, yellow staminal filaments. Fruit 3–4 inches long, appressed on one side, bluish when mature, and contains an edible pulp; seeds black,

rounded, deeply grooved, and mucilaginous on the surface; May–June.—Fairly common in the upper Nanay (alt. 600 ft.); frequently in humid areas or in the vicinity of streams.

Sapwood pale yellow with extensive grayish brown areas; heartwood reddish to dark brown. Wood has no distinctive odor or taste; straight-grained; fairly fine- to medium-textured; light in weight, but firm; inclined to be fibrous or splintery; subject to stain and insects; perishable. Growth rings indistinct. Parenchyma in numerous, fine, often indistinct lines extending between the rays. Pores at limit of vision; fairly numerous, uniformly distributed; in radial multiples of 2–5, less often solitary, seldom in clusters; open or closed. Vessel lines short, fine, and of same color as background. Rays faintly visible to unaided eye on cross section; indistinct on other surfaces. Large radial canals present.

Loreto: upper Nanay, *938*, *1103*.

6. MALOUETIA A. DC.

Small or medium-sized, slender, forest trees with black twigs. Leaves subleathery or leathery and opposite. Flowers few, terminal; corolla white and fragrant.

Wood creamy yellow or oatmeal-colored to pale brown, often with a pinkish or grayish cast; odorless and tasteless; fine- to medium-textured; light in weight; easy to work; perishable. Parenchyma in fine, irregular lines extending between the rays. Pores of medium size; fairly numerous and uniformly distributed; in radial multiples, less often solitary; open or closed. Rays fine on cross section; usually indistinct without lens on all surfaces. Large radial canals present.

Malouetia furfuracea Spruce in Mart. Fl. Bras. 6, pt. 1: 93. 1860. *Cuchara-caspi*.

Slender tree, approximately 18 feet in height. Crown spreading. Trunk straight, erect, and undivided for from 8 to 10 feet. Bark pinkish or dark brown, fairly smooth, and secretes a bitter latex when cut. Leaves leathery, glabrous, ovate-lanceolate or oblong-ovate, and long-acuminate. Flowering in July.—Fairly common in some localities; in dry or humid loam in fairly dense forest subject to periodical inundations (alt. 350–400 ft.).

Wood variable in color from oatmeal to pale brown with a grayish tinge; fresh wood has an odor suggesting vinegar and is slightly bitter, odor and taste absent or indistinct in dried material; straight- or slightly roey-grained; fine-textured; easy to work, takes a smooth,

fairly lustrous finish, and holds its place fairly well. Growth rings occasionally present. Parenchyma barely visible with lens as irregularly spaced, concentric lines or extending only between the rays. Pores minute or small; in radial multiples of 2–4 or solitary. Vessel lines indistinct.

Loreto: Caballo-cocha, *2089*.

Malouetia furfuracea var. **grandifolia** Muell. Arg. in Mart. Fl. Bras. 6, pt. 1: 93. 1860. *Cuchara-caspi.*

Tree, from 18 to 27 feet tall. Crown spreading. Trunk erect, columnar, slender, and clear of limbs for 3 feet or so. Bark brown and yields a small amount of latex when cut. Leaves larger than in the preceding species (up to 6.5 inches long) and with distinct veins. —Not common; in flood-free forest (alt. 380 ft.).

Sapwood pale yellowish white with a grayish hue; heartwood dull brown, thin. Wood fine-textured; of light or medium weight. Parenchyma in numerous lines extending between the rays. Pores and rays slightly more distinct than in *M. furfuracea*.

Loreto: Caballo-cocha, *2216*.

Malouetia Tamaquarina (Aubl.) A. DC. Prodr. 8: 378. 1844; Mart. Fl. Bras. 6, pt. 1: 92. 1860. *Cuchara-caspi, Chicle.*

Forest tree, from 30 to 50 feet or more in height. Crown round or spreading. Trunk straight or moderately so, cylindrical, up to 20 inches in diameter, and clear of branches for from one-half to two-thirds the entire height. Bark reddish or purplish brown, scaly, and furnishes a copious quantity of fairly sweet latex.

Wood oatmeal or pale yellow in color with pinkish or greenish gray areas; straight-grained; fine-textured; of light or medium density; saws slightly woolly; not durable. Pores small or at limit of vision; mostly in radial multiples of 2–6; lustrous tyloses sometimes present. Vessel lines discernible without lens.

Loreto: lower Itaya, *159;* upper Nanay, *928*, *973*(?).

7. PARAHANCORNIA Ducke

Parahancornia Amapa (Huber) Ducke, Archiv. Jard. Bot. Rio Janeiro 3: 242. 1922. *Naranjo podrido.*

Tall, forest tree, often attaining a height of 110 feet. Crown spreading. Trunk erect, columnar, 36 inches in diameter, and clear of branches up to four-fifths the entire height. Bark 0.5 inch or more thick, reddish brown, and scaly; bark and sapwood when cut

yield a copious quantity of latex, which is often mixed with balata in order to improve, according to the natives' belief, the consistency of the latter. Leaves glabrous, narrowing to the base, and short-acuminate at the tip. Corolla yellowish white. Fruit large, green, and contains a yellowish pulp with an agreeable flavor; March–May. —Not common; usually in humid areas (alt. 450 ft.).

This species was placed by Huber in the genus *Hancornia*, but Ducke (l.c.) observes that "the flowers differ from the last-named genus and should be considered as a distinct genus between *Hancornia* and *Couma*. . . . The venation of the leaves and the inflorescence resemble *Zschokkea*."

Sapwood uniform pinkish brown; heartwood chocolate brown, well defined. Wood odorless and tasteless; straight- or irregular-grained; moderately fine- to medium-textured; of medium density; easy to cut and takes a smooth polish; durable. Growth rings absent or poorly defined. Parenchyma in numerous, fine, evenly spaced lines extending between the rays, slightly finer than the latter. Pores at limit of vision or indistinct; fairly numerous to numerous, uniformly distributed; in radial multiples of 2–7, less frequently in small clusters, seldom solitary; open or filled with pale yellowish deposit. Rays fine and evenly spaced on cross section; not visible without lens on tangential; sometimes distinguishable to unaided eye on moistened radial; multiseriate. Large radial canals present.

Loreto: upper Nanay, *913*.

8. PLUMERIA L.

Plumeria tarapotensis K. Schum. Bot. Jahrb. 40: 410. 1908; Notizbl. Bot. Gart. Berlin 11: 339. 1932. *Bellaco-caspi*.

Small or medium-sized tree, from 27 to 45 feet in height. Crown spreading; branches stout. Trunk straight, round, up to 10 inches or more in diameter, and clear of branches for from 6 to 9 feet. Bark pinkish or dark brown with a grayish tinge, scaly or with small fissures. Leaves alternate, petiolate. Flowers conspicuous, white, in terminal cymes; October–December. Fruit woody, borne in pairs; seeds numerous, winged.—In sandy or heavy loam along edge of paths in forest or among shrubs and small trees (alt. 550–1,500 ft.). Timber is employed to a limited extent for general construction. The slightly sweet latex obtained by making incisions in the heartwood is said to be used in native medicine and an infusion obtained by boiling the fruit is reputed also to be beneficial for fevers.

Sapwood well demarcated, oatmeal-colored or pale brown, often with a grayish or pinkish cast; heartwood dark brown, thin. Wood has no distinctive odor or taste; straight-grained; fine- to medium-textured; of moderately light or medium weight; not difficult to work, takes a dull polish; susceptible to stain and insects; perishable. Growth rings absent or present. Parenchyma lines numerous, fine or very fine, irregular, often obliquely disposed, extending between the rays, and producing a hoary effect when seen under lens. Pores mostly of medium size; fairly numerous, well distributed; in radial multiples of up to 4, less often tangentially arranged or solitary; open. Vessel lines indistinct without lens. Rays numerous, very fine; indistinct without lens on all surfaces; uniseriate. Large radial canals present.

Loreto: Yurimaguas, *3895*, *3988*, *4021;* lower Huallaga, *7835*. —San Martín: Tarapoto, *5605*, *6559*.

9. RAUWOLFIA Ruiz & Pavón

Rauwolfia Duckei Markgr. Rep. Spec. Nov. 20: 117, 121. 1924. *Chiric-sanango.*

Tree, 20 feet in height. Crown spreading. Trunk round, bent, slender, and unbranched for 9 feet. Bark dark brown, with numerous short, coarse ridges. Flowers small, white, in loose axillary cymes; June–July. Fruit a drupe with 1 or 2 seeds.—Not common; in slightly humid loam in dense forest (alt. 380 ft.).

Wood uniform creamy yellow or pale pinkish; has no distinctive odor, occasionally slightly bitter; straight- or interwoven-grained; fine-textured; of fairly light to medium density; easy to work and takes a smooth finish; fairly durable. Growth rings present or poorly defined. Parenchyma in numerous, very fine or indistinct lines extending between the rays; hoary. Pores small or very small; very numerous, well distributed; solitary or in multiples or rows; open. Rays fine, but faintly visible without lens on cross section and occasionally on radial; multiseriate. Large radial canals present.

Loreto: Pebas, *1915*.

10. TABERNAEMONTANA L.

Erect shrubs or small trees, widely distributed throughout the tropics. Leaves opposite, often unequal, glabrous or nearly so. Flowers rather small, white or pale yellow, in terminal or sublateral cymes, calyx 5-lobed; corolla salverform, with slender tube. Fruit consists of 2 short, fleshy pods; seeds ellipsoidal.

Wood varies in color from yellowish to pale or dark brown, often streaked; has no characteristic odor or taste; fine- or fairly fine-textured; of light or medium weight; inclined to be fibrous, but easy to work; perishable. Parenchyma lines fine or indistinct, extending between the rays. Pores minute or small; numerous or fairly numerous; solitary or less often in multiples; open. Rays fine; indistinct without lens on all sections. Large radial canals present.

Tabernaemontana Benthamiana Muell. Arg. in Mart. Fl. Bras. 6, pt. 1: 80. 1860. *Siuca-sanango.*

Shrub, from 6 to 16 feet tall, with many branches and short, slender trunk. Bark yellowish brown or dark purplish, with long, coarse, vertical ridges. Leaves membranaceous, ovate or elliptic, short-acuminate. Corolla lobes white and pale yellow at center within. Fruit orange red.—Common on the plain of Tarapoto (alt. 1,500 ft.); most frequently in sandy loam along edge of paths or among shrubs and small trees of secondary growth.

Wood pale brown, not sharply demarcated into sap and heart; of fairly light or medium weight; straight- or interwoven-grained; easy to cut and takes a smooth, dull polish; checks in drying. Growth rings present. Pores small or fairly small; in radial multiples of up to 8 or more, less frequently solitary. Vessel lines not visible without lens; grayish white deposit common. Rays moderately numerous or numerous and lighter-colored than surrounding elements on cross section. Pith light brown; lustrous deposit of calcium oxalate fairly common.

San Martín: Tarapoto, *5508*, *6290*.

Tabernaemontana olivacea Muell. Arg. in Mart. Fl. Bras. 6, pt. 1: 75. 1860.

Shrub, 10 feet tall, with many branches. Trunk straight, short, and slender. Bark dark brown, scaly or with prominent anastomosing ridges. Leaves oblong-ovate or elliptic-ovate. Corolla creamy white.—Uncommon; in open dry loam along margin of forest (alt. 500 ft.).

Wood pale yellowish or dark brown; interwoven-grained; light in weight; slightly fibrous. Growth rings present. Pores minute or very small; fairly numerous; in radial multiples of 2–6 or more, less frequently solitary or in tangential multiples of 2. Vessel lines indistinct. Rays barely visible to unaided eye on moistened cross section and occasionally on radial.

Loreto: lower Huallaga, *4194*.

Tabernaemontana Poeppigii Muell. Arg.(?), Linnaea 30: 405. 1859–60. *Uchu-sanango.*

Shrub, about 18 feet tall, with few branches and long, slender trunk. Twigs glabrous, with long internodes. Bark pale pink with a grayish cast and secretes when cut a copious quantity of bitter latex, said to be used in native medicine. Leaves membranaceous and short-stalked.—Uncommon; among shrubs and small trees of secondary growth (alt. 1,300 ft.).

Wood creamy yellow, streaked with dark chocolate brown; interwoven-grained; light in weight. Growth rings absent or poorly defined. Pores fairly numerous; in radial multiples of 2–3.

San Martín: Tarapoto, *6704.*

Tabernaemontana Sananho Ruiz & Pavón, Fl. Peruv. 2: 22. *pl. 144.* 1799. *Sanango, Sanangillo, Sananho.*

Tall shrub or small tree, at times up to 27 feet in height. Crown spreading. Trunk slender and unbranched for 4 or 5 feet. Bark pale or dark brown, with rather coarse ridges, and exudes a copious quantity of slightly bitter latex. Flowers white; June–August. Fruit orange-colored with a greenish hue; September–October.—Very common throughout the lowland (alt. 350–400 ft.); in open patches or along margin of forest; said to grow up to an altitude of 2,100 feet.

Sapwood varying in color from canary or creamy yellow to light brown with grayish or pale purplish streaks; heartwood grayish brown, thin. Wood interwoven-grained; light in weight and rather soft; somewhat fibrous, easy to cut; subject to stain. Growth rings absent. Parenchyma indistinct. Pores very numerous and tending to crowd; solitary or in radial multiples of 2–8. Rays numerous and very fine.

Loreto: Caballo-cocha, *2109, 2468;* La Victoria, *2831;* lower Huallaga, *4656.*

11. THEVETIA Adans.

Thevetia peruviana (Pers.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4, Abt. 2: 159. 1895. *Bellaquillo.*

Uncommon, slender shrub, up to 10, occasionally 18, feet in height. Trunk virgate; twigs grayish. Bark pale greenish brown, with small, light-colored lenticels and dark brown inner bark, and exudes when cut a bitter latex, said to be used by the natives for relieving toothache. Leaves alternate or verticillate, linear, long-

attenuate at base, leathery, lustrous above. Flowers yellow, showy, fragrant, in terminal cymes; December–January. Fruit drupaceous, red; seeds brown.—Among shrubs and small trees in sandy loam (alt. 1,400 ft.); sometimes cultivated for ornamental purposes.

Sapwood uniform pale brown; heartwood dark brown or almost black. Wood has no distinctive odor, but bitter to taste; straight- or fairly straight-grained; uniformly fine-textured; of medium weight or fairly heavy; easy to cut and takes a smooth finish. Growth rings indicated by terminal parenchyma. Pores small; numerous or fairly numerous, well scattered; in radial multiples or rows of 2–6 or more, less frequently solitary; open. Vessel lines fine and barely visible without lens. Rays fine; sometimes discernible without lens on radial surface; invisible to unaided eye on other sections; uniseriate. Large radial canals present.

San Martín: Tarapoto, *5478*.

12. **ZSCHOKKEA** Muell. Arg.

Lactescent shrubs or small trees. Leaves opposite and leathery. Flowers small, white or pale yellow. Fruit a small, rounded, 1-seeded berry; seeds ellipsoidal.

Wood yellowish to pale or deep pinkish brown, often with a grayish cast, not always sharply demarcated into sap and heart; odorless and tasteless; straight-grained; moderately fine- or medium-textured; of light or medium density; sometimes fibrous and at times takes a lustrous polish; perishable. Parenchyma lines indistinct, extending between the rays. Pores of medium size; fairly numerous to numerous, uniformly distributed; in multiples or rows, less frequently solitary or in clusters; open or closed. Rays fine on cross section; sometimes distinct on radial; uniseriate. Large radial canals present.

Zschokkea floribunda (Poepp.) Muell. Arg. in Mart. Fl. Bras. 6, pt. 1: 23. 1860.

Tall shrub or small tree, from 12 to 18 feet in height. Crown open. Trunk straight, round, slender, and unbranched for 3 or 5 feet. Bark medium brown with a grayish tinge and small, lighter brown lenticels; secretes when cut a small amount of insipid latex. Leaves subleathery, oblong-ovate, lustrous green above, opaque beneath. Flowers axillary or terminal, with greenish white corolla; August.—In clearings or along margin of forest (alt. 400 ft.).

Wood pinkish brown throughout; medium-textured; light in weight, but firm; easy to cut, capable of taking a smooth polish, and holds its place well when finished. Growth rings present owing to variation in depth of color. Parenchyma lines numerous, fairly evenly spaced, and tangentially or diagonally disposed. Pores at limit of vision; in radial rows or multiples of 2–4, less frequently solitary or in small clusters. Vessel lines fine, slightly darker than background. Rays numerous and closely spaced on cross section; slightly darker than adjacent elements and faintly discernible without lens on radial.

Loreto: Iquitos, *3739*.

Zschokkea gracilis (Benth.) Muell. Arg. in Mart. Fl. Bras. 6, pt. 1: 21. 1860.

Small tree or shrub, 12 feet tall. Trunk slender and unbranched up to half the height. Leaves leathery, ovate, petiolate. Flowers small, white; June–July.—Uncommon; in dry loam along margin of forest (alt. 400 ft.).

Wood yellowish or pinkish brown with a grayish cast; fine-textured; light in weight, but firm; takes a smooth, dull finish. Growth rings absent. Parenchyma lines fine and forming a fine network with the rays. Pores minute or small; well distributed; in radial multiples or rows of 2–5, also solitary or, less frequently, in small clusters. Vessel lines barely discernible without lens. Rays very fine, numerous, and evenly spaced on cross section.

Loreto: Pebas, *1738*.

Zschokkea peruviana Heurck & Muell. Arg. in Heurck, Obs. Bot. Pl. Nov. 148. 1871. *Huiqui-caspi*.

Uncommon, slender tree, from 30 to 38 feet in height. Crown spreading. Trunk straight, round, and unbranched for from 3 to 6 feet. Bark pinkish to dark brown, with small lenticels; inner bark pinkish brown. Flowers white; December–January. Fruit ovoid or subround, yellow when mature.—In sandy or dry medium loam among shrubs and small trees of secondary growth (alt. 500–1,500 ft.).

Wood pale pinkish brown, at times with a pale grayish cast; straight- or moderately straight-grained; medium-textured; of medium weight to fairly heavy; easy to cut and takes a smooth finish; checks in drying and subject to insects. Growth rings absent or poorly defined. Parenchyma lines numerous, irregularly disposed, sometimes invisible even with lens. Pores faintly visible

without lens; in radial multiples or rows of 2–6, less frequently solitary or in clusters; open or closed. Grayish white deposit sometimes visible without lens in vessels. Rays numerous and closely spaced on cross section; occasionally distinguishable to unaided eye on radial. Pith medium to dark brown; grayish white raphides present.

Loreto: Fortaleza, lower Huallaga, *4384*.—San Martín: Tarapoto, *6562*.

Zschokkea ramosissima (Spruce) Muell. Arg. in Mart. Fl. Bras. 6, pt. 1: 21. 1860. *Pajar-umu, Quina-quina.*

Small tree or tall shrub, not exceeding 18 feet in height. Crown spreading. Trunk moderately straight, 9 inches in diameter, and branching 2 or 3 feet from the base. Bark reddish or purplish to dark grayish brown, scaly or with numerous small bursts; bark and sapwood when incised exude a viscid, sweet latex, said to be tapped during the rainy season for medicinal use. Leaves leathery, ovate-lanceolate. Flowers subterminal, yellow or yellowish white; June–July.—Rather widely distributed; most frequently in open dry loam among shrubs and small trees (alt. 400–1,500 ft.).

Wood pale cream-colored to dark pinkish brown; straight- or fairly straight-grained; medium-textured; light and firm to rather heavy and tenacious; not difficult to work and takes a smooth polish; appears to be durable. Growth rings absent or present owing to variation in depth of color or abundance of parenchyma lines. Pores in radial multiples of 2–4, less often solitary or in small clusters; open or filled with pale gray or yellowish brown deposits. Vessel lines moderately fine. Rays indistinct without lens on all surfaces. Pith medium to dark chocolate brown.

Loreto: lower Nanay, *676;* near Yurimaguas, *3983*.—San Martín: Tarapoto, *6535*.

Additional numbers of the genus *Zschokkea* determined provisionally on the basis of wood specimens:

Loreto: lower Huallaga, *4546, 4678;* lower Nanay, *651*.

BORAGINACEAE. Borage Family

1. CORDIA L.

The most important genus of the family, represented abundantly throughout tropical America by shrubs or trees. Bark scaly, sometimes fibrous, and suggests walnut (*Juglans*). Leaves chiefly alternate, entire or toothed, usually with rough pubescence. Flowers

small or large, mostly white, arranged in cymes, spikes, or heads; calyx tubular or campanulate, usually 4–6-lobed. Fruit a fleshy drupe. Some of the timbers are used locally for carpentry and general construction.

The Peruvian species are light to dark brown; light in weight and soft or firm to moderately heavy and hard; odorless and tasteless; medium- or coarse-textured; brittle, fibrous, and often take a lustrous finish; not very durable. They have certain general characteristics which make them readily recognizable and in some respects suggest elm (*Ulmus*). Parenchyma paratracheal, also in tangential or concentric bands which, in some instances, appear to indicate limit of growth rings. Pores fairly numerous or numerous; solitary or in multiples, less frequently in clusters; usually open. Rays broad on cross section and distinct on other surfaces. Vertical canals, gummosis type, occasionally present.

Vessels have simple perforations; intervascular pits rather small. Parenchyma cells coarse. Rays heterogeneous; multiseriate (3–5 cells wide), the marginal cells often very large. Wood fibers have small, simple pits.

Cordia alliodora (Ruiz & Pavón) Cham. in DC. Prodr. 9: 472. 1845.

Tree, from 25 to 40 feet in height. Crown round. Trunk straight, cylindrical, about 10 inches in diameter, and clear of limbs for more than half the entire height. Bark pale gray to dark brown or almost black, with low, anastomosing ridges. Leaves oblong-elliptic, entire, acuminate, finely stellate-pubescent, and have an odor suggesting garlic when crushed. Flowers small, white, fragrant, in large panicles. Drupe small, white.—Fairly common; in secondary growth or in low forest (alt. 400–1,500 ft.). Timber is employed locally for general construction and in the manufacture of vehicles.

Sapwood variegated light brown, lustrous; heartwood dull, slightly darker brown, perishable. Wood has no distinctive odor or taste; light to moderately heavy, hard, strong, but brittle; straight- or roey-grained; medium-textured; easy to work, takes a smooth polish, and holds its place well when finished. Growth rings absent or poorly defined. Parenchyma paratracheal or in broken, irregularly spaced, concentric bands. Pores at limit of vision; fairly numerous, in some specimens showing a tendency to diagonal alinement; in radial or tangential multiples of 2 or more, less often solitary; open or at times filled with tyloses. Rays visible without lens in

some specimens on cross and tangential sections; considerably darker than background and conspicuous on radial.

Loreto: lower Itaya, *318;* lower Huallaga, *4306.*—San Martín: Tarapoto, *6751.*

Cordia heterophylla Roem. & Schult. Syst. Veg. 4: 800. 1819. *Bacurí.*

Tree, approximately 25 feet in height. Crown flat. Trunk straight, slender, round, and clear of branches for 18 feet. Bark moderately thick, light brown with darker patches. Leaves short-stalked, elliptic, acute or acuminate at base, rounded or acute at apex, finely pubescent, especially along midrib and lateral veins. Inflorescence cymose. Fruiting in May–June.—Confined to the lowland; in dense, flood-free forest (alt. 400 ft.). Wood is not used locally except for fuel.

Sapwood well defined, pale brown; heartwood slightly darker brown. Wood straight- or wavy-grained; medium-textured; of medium weight and strong; easy to work, takes a smooth, highly lustrous finish with characteristic figure owing to the prominent rays. Pores rather distinct. Vessel lines and rays somewhat more prominent than in *C. alliodora.*

Loreto: lower Nanay, *578.*

Cordia laurifolia Killip, ined. *Mote-mullaca.*

Shrub or small tree, about 16 feet tall. Crown round, dense. Trunk erect, fairly cylindrical, up to 7 inches in diameter, and branching from near the base. Bark pale brown, moderately smooth. Flowers white; January–February.—Uncommon; in thickets or low forest (alt. 1,800 ft.).

Sapwood pale yellowish or light brown; heartwood dull brown. Wood straight- or interlocked-grained; medium- to coarse-textured; light in weight, but firm; requires a sharp knife to cut smoothly across grain; subject to insects. Rays not conspicuous, but readily visible on all surfaces.

San Martín: Juan Guerra, *6841.*

Cordia nodosa Lam. Ill. 1: 422. 1791. *Añallio-caspi, Almendrillo.*

Slender tree, up to 35 or 40 feet in height. Crown open or umbrella-shaped, and with few branches. Trunk straight, cylindrical, and free of limbs up to three-fourths the height. Bark grayish to dark brown, deeply fissured, scaly, and with numerous, small lenticels; inner bark at times slightly fibrous. Twigs pubescent,

rufous. Leaves oblongate, glabrous or pubescent, with short, stout petioles. Flowers white. Fruit ovoid, with long, rufous hairs, yellow when mature.—Common in the lowland and occasionally in the upland, in flood-free forest (alt. 400–1,500 ft.); reported also from San Ramón, Department of Junín (alt. 4,500–5,000 ft.), near the Perene bridge, in the Paucartambo Valley, and in the Department of Huánuco. Timber is used to some extent for general carpentry.

Sapwood not always well defined, lustrous pale brown, but somewhat darker than the other species of *Cordia* described here; heartwood dull brown. Wood slightly fragrant; straight-grained; medium- to rather coarse-textured; light in weight or moderately so, firm; saws rather woolly; splits readily. Vessel lines appear as long, dark scratches.

Loreto: upper Nanay, *1229;* Caballo-cocha, *2334;* La Victoria, *2679;* San Juan, near Iquitos, *3748;* Yurimaguas, *4305, 4677;* Iquitos, *7974.*—San Martín: Tarapoto, *6516.*

Cordia tetrandra Aubl. Pl. Guian. 1: 222. *pl. 87.* 1775. *Tahuampa-caspi.*

Forest tree, 25 feet or more tall. Crown spreading. Trunk straight, columnar, slender, and clear of branches for 3 feet. Bark light brown, fairly smooth; inner bark slightly fibrous. Leaves ovate, alternate, entire or with undulating margins, acute, unequal at base, petiolate, glabrous above, rough beneath. Flowers in terminal corymbs. Drupe light green and secretes a viscid, translucent sap.—Of limited occurrence; in sandy loam among shrubs and small trees, occasionally in humid loam in dense forest (alt. 1,400 ft.).

Wood pale brown; interlocked- or straight-grained; medium- or rather coarse-textured; light in weight; easy to cut, brittle, and takes a highly lustrous polish; checks in drying. Rays readily visible on all surfaces.

San Martín: Morales, near Tarapoto, *5676.*

Cordia Ulei Johnston, var. **ucayaliensis** Johnston, Contr. Gray Herb. 92: 57. 1930.

Tree, from 22 to 36 feet tall. Crown spreading. Trunk compressed, tortuous, about 9 inches in diameter, and branching a few feet from the base. Bark moderately thick, dark brown, fairly smooth or with small anastomosing ridges; inner bark bristly or coarsely fibrous. Leaves long-stalked, obovate-oblong or oblong-

oblanceolate, pubescent on both surfaces, cuneate, abruptly obtuse or rounded at base, rounded, obtuse, or short-acuminate at apex. Inflorescence in terminal panicles; corolla white.—Common; in secondary growth or flood-free forest (alt. 400–500 ft.).

Sapwood variegated pale brown, highly lustrous; heartwood dull brown. Wood straight- or interlocked-grained; rather coarse-textured; light in weight, but firm and splintery; not durable. Pores rather few and well scattered; solitary or in radial or tangential multiples of 2–4; often filled with lustrous tyloses.

Loreto: Caballo-cocha, *2333;* Yurimaguas, *3832, 4387.*

VERBENACEAE. Verbena Family

Trees, shrubs, herbs, sometimes vines. Leaves chiefly opposite and simple, toothed or entire. Flowers small or large, variously arranged, and either regular or irregular; calyx 2–5-lobed; corolla with 4 or 5 lobes; stamens usually 4 and in pairs, occasionally 2 or 5. Fruit a fleshy drupe or dry and separating into 2 or 4 nutlets. The best-known and most important wood of this family is teak (*Tectona grandis* L. f.), a native of southeastern Asia and the Malay Archipelago.

In the Peruvian species the wood varies from cream-colored, tan, whitish, or yellowish to pale pinkish brown, occasionally with a grayish cast; heartwood sometimes fairly well defined, light to dark brown. Wood odorless and tasteless; mostly fine- or fairly fine- to medium-, infrequently coarse-textured; light and soft (*Aegiphila*), to fairly heavy and compact (*Callicarpa*); easy to cut and takes a moderately lustrous or highly lustrous finish; perishable or fairly durable. Parenchyma sparingly developed; paratracheal, infrequently aliform; often invisible even with lens. Pores of small to medium size, infrequently large; rather few to numerous and uniformly or moderately uniformly distributed; solitary or in small multiples, less often in rows or in small clusters; infrequently closed. Rays fine on cross section in *Aegiphila* and *Lippia,* occasionally fairly broad in *Callicarpa* and *Vitex;* at times visible to unaided eye on tangential and radial surfaces in *Callicarpa* and *Vitex,* and on moistened radial section in *Lippia.*

Vessel perforations mostly simple to scalariform; intervascular pits usually small; vessel-ray pits rather large, simple to half-bordered. Rays heterogeneous; 1–7 cells wide and few to 50 or more cells high. Wood fibers sometimes thick-walled and septate; pits simple.

1. AEGIPHILA Jacq.

Shrubs or small trees. Leaves entire. Flowers in terminal panicles or in dense, axillary or lateral cymes; corolla with spreading limb. Fruit a fleshy drupe; nutlets distinct. Common throughout northeastern Peru, especially in the lowland, and most frequently encountered among shrubs and low trees of secondary growth. Timber is not used locally for any particular purpose.

Wood variable in color from creamy white or yellowish to pale brown and not sharply demarcated into sap and heart; odorless and tasteless; medium- to coarse-textured; light and fairly soft to medium in weight; often requires a sharp knife to cut smoothly across grain and saws slightly woolly; perishable. Parenchyma paratracheal or infrequently aliform; indistinct with lens. Pores fairly small to large; rather few to fairly numerous, tending to be arranged in concentric bands one pore wide; predominantly solitary, also in small radial multiples, seldom in rows; open. Rays fairly fine on cross section, occasionally curving slightly at point of contact with the pores; invisible to unaided eye on other surfaces; heterogeneous; 2–3 cells wide.

Aegiphila filipes Mart. & Schau. in DC. Prodr. 11: 652. 1847. *Chirapa-sacha.*

Shrub or small tree, up to 27 feet in height. Crown spreading. Trunk straight, cylindrical, slender, and free of branches up to half the height. Bark thin or moderately so, light brown or grayish, ridged. Leaf blades oblong or elliptic, entire, acuminate, acute at base, chartaceous, glabrous above and below. Inflorescence in dense, axillary cymes; flowers small, yellow. Drupe yellow or orange-colored.—Common throughout the lowland (alt. 350–450 ft.); in secondary growth. Wood is not used locally.

Wood pinkish or pale brown with grayish patches; has an insipid taste; light in weight and fairly soft or spongy; straight-grained; coarse-textured; saws woolly, but takes a smooth finish; subject to stain and insect attacks; not durable. Growth rings poorly defined or absent. Parenchyma visible with lens as fine bands surrounding the pores and often in fine lines uniting them. Pores of small or medium size; few and scattered or tending to ring-porous; solitary or less frequently in radial multiples of 2, seldom more; open. Vessel lines fine and indistinct or slightly darker-colored than background. Rays distinguishable only with lens on cross section;

discernible, but not distinct, on tangential; sometimes barely visible without lens on radial surface.

Loreto: lower Nanay, *533, 534;* Caballo-cocha, *2165, 2469;* La Victoria, *2622, 2832, 3115, 3146;* near Iquitos, *8190.*

Aegiphila peruviana Turcz. Bull. Soc. Nat. Mosc. 36: 219. 1863. *Chirapa-sacha.*

Shrub, about 12 feet tall. Bark moderately thick, pale grayish brown, scaly. Leaf blades ovate, acuminate, acute at base, puberulent on both surfaces. Inflorescence axillary or terminal. Drupe globose, semi-inclosed by mature calyx, glabrous, and umbilicate at both ends.—Common on the plain of Tarapoto (alt. 1,300 ft.); in secondary growth. Timber is not employed locally for any particular purpose.

Sapwood pinkish or pale brown; heartwood yellowish white. Wood odorless and tasteless; straight-grained; fine- or medium-textured; light, but firm; takes a smooth, lustrous finish.

San Martín: Tarapoto, *5588, 6152.*

Aegiphila Smithii Moldenke, Brittonia 1: 191. 1932.

Small, slender, straggly tree, seldom exceeding 30 feet in height. Crown spreading. Trunk round, slender, and branching from near the base. Bark thick, scaly, reddish brown. Leaf blades ovate or narrow-ovate, acuminate, acute or rounded at base, glabrous above, tomentose beneath. Flowers pale yellow or cream-colored. Drupe bright orange, turning brown at maturity, included in the calyx. Timber is used for fuel only.

Sapwood not distinctly defined, darker brown than heartwood; heartwood pale pinkish brown or almost white, lustrous. Wood odorless and tasteless; straight-grained; medium-textured; light in weight or moderately so; tenacious, but stringy; takes a fairly smooth finish; probably durable.

Loreto: upper Nanay, *680;* near Iquitos, *3869*(?); collected also at Puerto Yessup, Department of Junín.

2. CALLICARPA L.

Shrubs or small trees. Leaves short-stalked, toothed. Flowers white, in axillary cymes. Fruit fleshy, black when mature. Fairly common; in thickets or in open patches among low trees.

Wood whitish or pale tan-colored to light brown; odorless and tasteless; fine- or fairly fine-textured; of medium weight to moder-

ately heavy; easy to cut; fairly durable. Parenchyma indistinct. Pores of small to medium size; fairly numerous and uniformly distributed; solitary, less often in multiples or rows, seldom in clusters; open or closed. Rays fine to moderately broad on cross section; occasionally fairly distinct on tangential and radial surfaces; distinctly heterogeneous; most often 2–3 cells wide.

Callicarpa sp. Shrub, 15 feet tall, with long, slender trunk. Bark pale brown, with small scales.—Fairly common on the plain of Tarapoto (alt. 1,400 ft.); in secondary growth.

Wood uniform pale brown throughout; odorless and tasteless; interlocked-grained; uniformly fine-textured; tenacious and strong; fairly durable.

San Martín: Tarapoto, *6168*.

Callicarpa sp. Shrub, from 10 to 15 feet in height. Trunk slender and branching from near the base. Bark thin, purplish or pale brown.—Abundant around Tarapoto (alt. 1,300–1,600 ft.); in thickets or in open patches in forest.

Wood slightly coarser-textured than *6168;* otherwise the two specimens show close resemblance.

San Martín: Tarapoto, *6817*.

3. LIPPIA L.

Lippia virgata (Ruiz & Pavón) Steud. Nom. ed. 2, 2: 751. 1841. *Chichara-caspi*.

Tree, approximately 25 feet in height. Crown spreading. Trunk erect, columnar, from 7 to 10 inches in diameter, and clear of branches for 4 feet. Bark pale yellow or light brown, with long, coarse, deep fissures. Leaves opposite, ovate or lanceolate, acuminate, acute at base. Flowers small, white or with a violet hue, fragrant; calyx toothed; stamens 4; December–January. Fruit dry, 2-celled, included in the calyx.—Common on the plain of Tarapoto (alt. 1,400 ft.); in open sandy loam, often along banks of streams. Wood is used only for fuel.

Sapwood yellowish or pale pinkish brown; heartwood light brown. Wood odorless and tasteless; fairly fine-textured; of medium density, tenacious, and rather splintery; easy to work and takes a smooth, fairly lustrous finish; moderately durable. Growth rings poorly defined and appear to be indicated by slight variation in depth of color. Parenchyma indistinct with lens. Pores of small or medium

size; numerous and well distributed; mostly in radial multiples of 2–3, also solitary; occasionally filled with yellowish white deposit. Vessel lines short, fine, and barely at limit of vision. Rays fine and numerous on cross section; indistinct without lens on tangential; fairly distinct on moistened radial surface.

San Martín: Tarapoto, *5565*.

4. VITEX L.

Vitex triflora Vahl, Eclog. Am. 2: 49. 1798.

Shrub or small tree, 15 feet tall, with many elongated branches. Trunk slender and branching 1 or 2 feet from the base. Bark pale yellow or light green, smooth; wood beneath bark chocolate brown. Leaves opposite, digitately compound; the leaflets entire. Flowers sky blue; calyx bell-shaped, 5-toothed; corolla with short tube and 2-lipped limb. Fruit a drupe.—Uncommon; along edge of swamps or in open patches in dense forest (alt. 500 ft.). Timber is not used locally.

Sapwood fairly well defined, creamy yellow with a grayish tinge and darkening slightly on exposure to sunlight and air; heartwood pale purplish brown or tan-colored. Wood odorless and tasteless; straight- or slightly wavy-grained; medium-textured; of medium weight to moderately heavy; fairly easy to cut and holds its place well. Growth rings present, but poorly defined. Parenchyma indistinct. Pores rather small or barely discernible to unaided eye; fairly numerous and well distributed; solitary or in radial multiples of 2–3, infrequently in diagonal or tangential multiples or rows of 2; open. Vessel lines fine, short, and barely at limit of vision. Rays lighter-colored than background, evenly spaced, and rather distinct on moistened cross section; sometimes barely visible to unaided eye on moistened tangential and radial surfaces.

Vessel perforations simple; vessel-ray pits often elongated and rather large, mostly half-bordered. Rays heterogeneous in part; 1–7 cells wide and few to 50 cells or more high. Wood fibers have simple pits.

Loreto: lower Huallaga, *4195*.

SOLANACEAE. Potato Family

A large and important family, particularly well developed in the tropics, consisting of small trees, shrubs, or herbs, often armed with prickles, and the pubescence frequently of branched hairs. Leaves alternate or sometimes opposite, either simple or compound, without

stipules. Flowers perfect, small or large and showy, variously arranged, regular or nearly so; corolla of united petals, stamens normally 5, inserted on the corolla tube. Fruit a berry or capsule. The timber is not utilized locally, but the fruit of *Solanum* is employed in some regions in the lowland as a substitute for soap.

Wood whitish or cream-colored to medium brown or pale pink, at times with dark grayish streaks; most often without distinctive odor or taste; fairly fine- or medium-textured; light and soft to moderately hard and rather tenacious; saws woolly and often requires a sharp knife to cut smoothly across grain; not durable. Parenchyma paratracheal; often indistinct. Pores of small to medium size, in *Solanum* sometimes fairly large; rather few to moderately numerous; solitary or in multiples, seldom in rows or clusters; most often open. Rays moderately fine to rather broad on cross section; invisible or occasionally discernible without lens on tangential; distinguishable at times in proper light on radial surface.

Vessel perforations exclusively simple; intervascular pits large or fairly large; margins either round to ellipsoid or elongated and coalescing; vessel-parenchyma pits simple and large or bordered. Rays heterogeneous; uniseriate in *Cyphomandra*, multiseriate (1–4 cells wide) in *Cestrum* and *Solanum*, up to 25 cells or more high.

1. CESTRUM L.

Shrubs or small trees. Leaves large or small, narrow, entire, stalked. Flowers white or greenish, clustered in the leaf axils or in cymes; calyx 5-lobate or 5-dentate; corolla salverform or funnelform; filaments filiform. Fruit a small, often juicy, 2-celled berry. Wood is not used locally.

Wood whitish or pale yellowish brown, sometimes with dark grayish patches; odorless, often bitter; fine- or moderately fine-textured; light in weight, rather soft, but tenacious; not durable. Parenchyma indistinct. Pores of small or medium size; rather few to numerous and uniformly distributed; solitary or in small radial multiples, infrequently in multiples or in small clusters; open. Rays fairly broad on cross section; occasionally visible without lens on radial surface. Large radial canals occasionally present.

Vessel perforations simple; intervascular pits large or fairly large, with round, ellipsoid, or elongated and coalescing margins. Rays heterogeneous; 1–4 cells wide.

Cestrum Baenitzii Lingelsh. Repert. Nov. Sp. 7: 248. 1909.

Tree, up to 36 feet tall. Crown spreading. Trunk straight or bent, round, slender, and free of branches up to 14 feet. Bark medium brown with a grayish cast. Flowers small, pale yellow or white; May–June. Fruit ovoid, black when mature; September–October.—Widely distributed in the lowland, but nowhere common (alt. 500 ft.); forming undergrowth in dense forest free from seasonal inundations.

Sapwood creamy yellow when fresh, pale brown when dried and with extensive light or dark areas; heartwood dark brown, perishable. Wood odorless, sometimes slightly bitter; straight-grained; fairly fine- or medium-textured; of moderately light to medium density; slightly fibrous, easy to work; warps in drying; subject to stain and insect attacks. Growth rings absent. Parenchyma indistinct. Pores small; not very numerous, well distributed; solitary or in radial multiples, seldom rows, of 2–4 or more; small black specks of gum frequently visible with lens. Vessel lines fine, of same color as background; black gum or lustrous tyloses commonly present. Rays moderately fine, lighter-colored than background, and barely visible to unaided eye on cross section; indistinct on tangential; lighter- or darker-colored than adjacent elements on radial and occasionally faintly distinguishable without lens on moistened surface.

Loreto: Yarina-cocha, middle Nanay, *627;* Puerto Arturo, lower Huallaga, *5277*.

Cestrum racemosum Ruiz & Pavón, Fl. 2: 29. *pl. 154*. 1799.

Small tree, 21 feet in height. Crown open. Trunk contorted, compressed, slender, and unbranched for 10 or 11 feet. Bark light tan, with fairly small to rather distinct lenticels. Fruit round, black and soft when mature; January.—In sandy loam; among fairly tall trees (alt. 1,500 ft.).

Wood white throughout when fresh, turning to creamy yellow after long exposure and with pale gray stains when dried; odorless and tasteless or slightly bitter; straight-grained; medium-textured; light in weight, but firm; easy to work; checks in drying; not durable. Growth rings absent. Pores barely at limit of vision; fairly numerous and well distributed; mostly in radial multiples of 2–5, also in tangential pairs or small clusters, less frequently solitary; open. Vessel lines short, fine, and faintly visible without lens. Rays moderately

thin, lighter-colored than adjacent elements, and visible without lens on cross section.

San Martín: Tarapoto, *6620*.

Cestrum Sendtnerianum Mart. ex Sendt. in Mart. Fl. Bras. 10: 215. 1846. *Yerba-santa.*

Tall shrub or small, straggly tree, from 10 to 22 feet in height. Crown spreading. Trunk bent, round, slender, and branching 3 or 4 feet from the base. Bark medium brown with a greenish gray tinge and rather prominent, lighter-colored lenticels. Flowers white; October–November. Fruit ovoid, round, black when mature; May–July.—Widely distributed in the lowland, but not common (alt. 350–500 ft.); along margin of flood-free forest or in old clearings.

Wood creamy white when fresh, pale yellowish brown when dried; odorless, but has an astringent taste; straight- or interwoven-grained; fairly fine- to medium-textured; of moderately light to medium weight, firm; easy to cut and takes a fairly smooth finish; subject to stain and insect attacks. Growth rings absent or appear to be indicated by terminal parenchyma. Pores small or fairly small; rather numerous, well scattered; mostly in radial multiples or rows of 2–4, also solitary, infrequently in small clusters. Rays lighter-colored than background and barely or readily distinguishable without lens on cross section.

Loreto: Caballo-cocha, *2128;* Yurimaguas, lower Huallaga, *4522*.

Cestrum sp. *Yerba-santa.* Shrub, about 8 feet or more tall. Bark light tan with short, low ridges and small lenticels. Leaves employed locally as a substitute for soap. Fruit ovoid, blue; March–April.—In dry loam among shrubs and small trees of secondary growth (alt. 400 ft.).

Wood creamy white; odorless, but slightly bitter; fairly straight- or interwoven-grained; fine-textured. Pores small; mostly in radial multiples or rows of up to 5 or more. Rays moderately fine, unevenly spaced, lighter-colored than adjacent elements, and barely distinguishable without lens on moistened cross section.

Loreto: Iquitos, *7955*.

2. CYPHOMANDRA Mart.

Unarmed shrubs or small trees. Leaves dimorphous, the lower ones deeply pinnate-lobed, the upper entire. Corolla bell-shaped or saucer-shaped. Fruit a berry.

Wood white or cream-colored, fairly lustrous, and subject to blue stain; occasionally with unpleasant odor when fresh, but tasteless; medium-textured; light and soft; saws woolly; perishable. Parenchyma paratracheal; sparingly developed and indistinct. Pores of medium size; few and well scattered; solitary or in small radial multiples, seldom in small clusters; open. Rays fine or moderately fine on cross section; invisible on tangential; occasionally discernible in proper light on radial surface.

Vessel perforations simple; intervascular pits large or fairly large, sometimes elongated. Rays heterogeneous; uniseriate.

Cyphomandra sp. Tall shrub or small tree, about 12 feet in height, with flat top, few branches, and slender trunk. Bark light chocolate brown, smooth; inner bark lighter brown, fibrous. Flowers pale white; June–July. Fruit round, yellow, and soft when mature. —In dry loam along margin of forest (alt. 400 ft.).

Wood creamy yellow and fairly lustrous; odorless and tasteless; straight-grained; medium-textured; light in weight, but firm; slightly fibrous, easy to cut; subject to stain. Growth rings absent. Parenchyma indistinct. Pores of medium size and sometimes at limit of vision; not numerous and well distributed; solitary or in radial multiples of 2–3, less frequently in tangential pairs or in small clusters; mostly open. Vessel lines rather coarse and at limit of vision, but not conspicuous. Rays numerous, moderately thick, and lighter-colored than background; barely discernible without lens on moistened cross and radial surfaces.

Loreto: La Victoria, *2564*, *2827*, *2917*.

3. SOLANUM L.

Small trees, shrubs, frequently armed with sharp prickles, and often with pubescence of branched hairs. Leaves mostly simple but often deeply lobed, sometimes opposite, one of the pair being much smaller than the other. Flowers variously arranged; corolla saucer-shaped and 5-lobed, filaments short. Fruit a small or large, usually globose, berry. The local names for almost all species of *Solanum* are "cocona" and "siuca-huito" or "siuca-vito."

Wood whitish, pale pink, or cherry brown; odorless and tasteless; fairly fine- or medium-textured; light and soft to medium density; saws woolly, at times requires a sharp knife to cut smoothly across grain; highly lustrous; usually perishable. Parenchyma paratracheal; frequently indistinct. Pores moderately small to fairly large;

numerous or fairly numerous and well scattered; solitary or in small radial, diagonal, or tangential multiples, infrequently in small clusters; at times filled with black gum. Rays moderately fine and numerous to rather broad on cross section; invisible without lens on tangential; occasionally fairly distinct on radial surface.

Vessel perforations simple; intervascular pits large or moderately large. Rays heterogeneous; mostly 1–3 cells wide, and up to 25 cells or more high.

Loreto: La Victoria, *2584; 2598, 2981,* lower Itaya, *128, 296;* Pebas, *1888;* Puerto Arturo, lower Huallaga, *4983.*—San Martín: Lamas, *6352;* near Tarapoto, *5505.*

BIGNONIACEAE. Bignonia Family

Trees or woody vines. Leaves alternate or opposite, simple or compound, the terminal leaflet often replaced by a tendril. Some of the plants are noted for the beauty of their large and showy flowers; corolla of united petals, usually funnelform; calyx inferior and of united sepals; stamens 4, inserted on the corolla tube alternate with the lobes, a fifth sterile stamen usually present. Fruit a capsule of variable form, or sometimes baccate, and normally very large. A few of the species are highly valuable for their timber. Bark often fibrous, in *Crescentia* and *Tabebuia* separating into thin layers.

The woods exhibit a wide range of variation in their properties. Those described here are light-colored or pale brown; heartwood sometimes sharply defined and dark brown or greenish black as in *Tabebuia* (*Tecoma*); most often without distinctive odor or taste; medium- to coarse-textured; some of them are light in weight and soft to firm, as in *Crescentia,* to heavy, strong, and durable, as in *Tabebuia;* easy to work and capable of taking a smooth polish. Parenchyma paratracheal, aliform, or confluent; usually visible only with lens. Pores most frequently of medium size; numerous and well scattered; solitary or in small radial multiples; open. Rays very fine or fine on cross section; not visible without lens on all surfaces. Ripple marks present; all of the elements in horizontal seriation in *Tabebuia.*

Vessel perforations simple; intervascular pits rather large; in some instances spirals are present; vessel-ray pits small and half-bordered. Rays homogeneous, tending to heterogeneous; uniseriate or rarely more than 3 cells wide, and usually less than 15 cells high. Wood fibers with simple pits.

1. CRESCENTIA L.

Crescentia Cujete L. Sp. Pl. 626. 1753. *Huingo.*

The calabash tree, the best-known species of the genus, ranges between 15 and 45 feet in height. Crown spreading; branches long, stout, and drooping. Trunk bent, moderately round, short, and up to 14 inches in diameter. Bark fairly thick, pale brown, with numerous, shallow fissures; inner bark fibrous and separates into many thin, papery layers. Leaves simple and clustered on the stout branches, persistent, entire, oblanceolate or spatulate, acute or rounded at the tip, and tapering to the base. Flowers solitary or clustered along the trunk and older branches; corolla purplish yellow; April–June. The tree is noteworthy because of its large, gourd-like fruit with abundant pulp in which are imbedded many large seeds; the thin, hard, woody shell (epicarp), after removal of the pulp, is used for cups, dishes, and other utensils, often artistically ornamented by carving and painting. The seeds are edible when cooked. Its timber is employed for tool handles and vehicle parts.

Wood lustrous pale brown or yellowish brown with fine, dark veining; has no distinctive odor or taste; straight-grained; medium- to coarse-textured; light and soft to moderately heavy, hard, and strong; has the consistency of elm (*Ulmus*); easy to work, and takes a smooth finish; not durable. Growth rings indistinct or fairly well defined owing to the more orderly arrangement of the elements. Parenchyma abundantly developed; paratracheal and in broad, tangential, wavy bands connecting the pores; distinct also on tangential surface. Pores small, but visible; fairly numerous; solitary or in small radial multiples or rows; open. Rays fine on cross section; not visible without lens on all surfaces; homogeneous; uniseriate. Ripple marks present; indistinct and rather irregular; about 110 per inch length.

Loreto: lower Itaya, *192;* lower Nanay, *545.*

2. JACARANDA Juss.

Small or tall trees, with bipinnate leaves. Flowers bluish and often showy. Capsule as broad as long; seeds winged. The 60 known species constituting this genus are mostly from the Amazon region, although there are representatives in other parts of tropical America.

Wood creamy yellow to bright yellow or pinkish; straight- or moderately straight-grained; medium- to coarse-textured; light and

soft or medium in weight to fairly heavy and compact; sometimes takes a smooth, fairly lustrous polish, at other times saws woolly or is splintery. Parenchyma paratracheal, aliform, or confluent, occasionally terminal. Pores of medium size or large; fairly numerous and irregularly or uniformly distributed; solitary or in multiples; mostly open. Rays fine or moderately fine on cross section; invisible or barely visible on radial.

Vessels with simple perforations; vessel-ray pits small and half-bordered. Rays homogeneous, tending to heterogeneous; 1–3 cells wide and up to 20 cells high; cells thin-walled, rather coarse, and often gummy. Fibers thin-walled, abundantly pitted.

Jacaranda filicifolia D. Don(?), in Edinb. Phil. Journ. 9: 266. 1823. *Amchiponga.*

Tree, up to 50 feet in height. Crown round. Trunk straight, cylindrical, from 7 to 15 inches in diameter, and free of branches for about 20 feet. Bark extremely thin, pinkish or pale brown, smooth or with small scales.—Fairly common; in dense forest in the lowland (alt. 400 ft.).

Sapwood creamy yellow or pinkish, with pale brownish cast; heartwood dark brown, thin. Wood has no distinctive odor or taste; straight-grained; medium-textured; moderately heavy and hard; capable of taking a smooth polish; checks in drying; probably durable. Growth rings absent or poorly defined. Parenchyma in rather numerous, irregularly spaced, slightly wavy, fine bands uniting the pores, also paratracheal; often indistinct. Pores barely visible without lens; not very numerous, uniformly distributed; mostly solitary, also in radial multiples of 2–4; open. Vessel lines fairly distinct against the lighter-colored background. Rays indistinct without lens.

Loreto: lower Itaya, *229.*

The following have been determined provisionally on the basis of wood specimens:

Loreto: Yurimaguas, *4140;* Fortaleza, lower Huallaga, *4345.*—San Martín: Lamas, *6488.*

3. TABEBUIA Gómez (or TECOMA Juss.)

Trees. Leaves opposite, long-stalked; leaflets usually 5, large, entire or toothed, radiating from the end of the petiole. Flowers large and showy, in terminal panicles, cymes, or heads, usually borne when the tree is devoid of leaves. The pendent pods long and cylindric; seeds numerous, broadly winged. The Tabebuias are important

commercially throughout their range because of their valuable timber, useful for general construction and cabinetwork. Also, they are noted for their remarkably showy and brightly colored blossoms, which are either yellow or of varied tints of purple and pink, similar to those of the genus *Catalpa*. The two genera, *Tabebuia* and *Tecoma*, are closely allied and botanists differ as to the basis of their separation. As a result, species are frequently transferred from one genus to the other.

Sapwood pale yellow to medium brown, sometimes with a grayish tinge; heartwood yellowish brown to dark greenish brown, often well defined. Wood usually without distinctive odor or taste; fairly fine- or medium-textured; heavy, tenacious, strong, and durable; takes a smooth polish and holds its place well; resistant to stain and insects. Parenchyma inconspicuously paratracheal, also in irregular tangential or concentric bands containing the pores, occasionally in lines independent of the pores and also limiting growth rings; often distinct on longitudinal sections, being darker than background. Pores moderately small or medium-sized; numerous and well distributed; solitary or in small radial multiples; open or filled with a yellowish sulphur-like powder, lapachol, which covers the surface, and, when moistened with ammonia or dilute sodium carbonate, turns deep wine red. Rays fine, numerous, and closely spaced on cross section; invisible or barely discernible to unaided eye on all surfaces. Ripple marks present and usually regular; all elements storied; number per inch length, 100–144. (For further notes on *Tabebuia* and *Tecoma* see Record, Samuel J.: Timbers of Tropical America, 532–544.)

Tabebuia spp. *Tahuari, Tahuari amarillo, Tahuari negro.* Deciduous, forest trees, attaining a height of from 60 to 90 feet. Crown round. Trunk erect, columnar, from 12 to 25 inches in diameter, and unbranched up to half the entire height. Bark pale brown with extensive light gray patches, fairly smooth; inner bark separates into large, papery layers. Flowers deep yellow, fragrant, and showy; appearing in July–August when the leaves are absent. Fruit ovoid, compressed.—Widely distributed; usually in dense, tall forest free from seasonal floods (alt. 400–1,500 ft.). The dense heartwood is much esteemed for piling, rollers for sugar cane mills, handles for bush knives, blow pipes, and other purposes demanding strength and durability.

Loreto: La Victoria, *3176;* Pebas, *1881;* near Yurimaguas, *4435.*—San Martín: near Tarapoto, *5736, 6617.*

GESNERIACEAE. Gesneria Family

1. DRYMONIA Mart.

Drymonia sp. An epiphytic shrub, sometimes scandent. Bark medium brown with a grayish tinge; inner bark reddish brown. Leaves thick, rough. Corolla dark red; flowering in June–July.—Fairly common in some localities in the lowland (alt. 350–400 ft.); usually in dense, flood-free forest.

Wood lustrous light-colored or pale pinkish brown, turning to medium brown on exposure to air; odorless and tasteless; straight-grained; fine- or medium-textured; of fairly light or medium weight, firm; easy to cut; subject to stain. Parenchyma paratracheal, sometimes aliform or confluent. Pores at limit of vision; numerous and well distributed; in tangential or diagonal multiples of 2–4, also solitary or in clusters. Vessel lines darker than adjacent elements owing to gum contents. Rays fairly fine, numerous, and curving at point of contact with pores; visible only with lens on cross and tangential sections; fairly distinct on radial surface. Pith grayish white, with abundant translucent deposits and globules of brown gum.

Vessels with exclusively simple perforations; vessel-ray pits simple to half-bordered. Wood fibers with large lumina.

Loreto: Pebas, 1907.

ACANTHACEAE. Acanthus Family

Chiefly herbs, but sometimes shrubs, twining vines, or small, rarely medium-sized, trees. Leaves opposite, entire or essentially so, without stipules. Flowers perfect, frequently large and showy; calyx inferior, composed of 4 or 5 distinct or united sepals; stamens 2 or 4, inserted on the corolla tube alternate with the lobes. Fruit usually a 2-celled, dehiscent capsule, often contracted and stalked at the base; seeds 2 or several, attached by a thick, hook-like funicle or stalk. Wood is of no economic importance locally.

Woods exhibit a range in color from creamy or yellowish to pinkish or pale brown; occasionally, as in *Trichanthera*, have a slightly fetid odor, but without distinctive taste; fine- to coarse-textured; light and soft to medium weight; easy to work; subject to a bluish gray stain. Parenchyma paratracheal or metatracheal; indistinct to distinct. Pores small to readily visible without lens; few or fairly numerous and well distributed; solitary or in small radial multiples; mostly open. Rays moderately fine or broad on cross section; usually indistinct on tangential; sometimes visible without lens on radial surface.

Vessels with simple perforations; intervascular pits mostly very small, with slit-like apertures; vessel-ray pits simple to half-bordered or bordered, large, much elongated, often in scalariform arrangement. Rays heterogeneous; 1–5 cells wide and few to 40 cells high; the cells frequently elongated in the vertical direction. Wood fibers thin-walled, often septate, and with large, simple pits.

1. PACHYSTACHYS Nees

Pachystachys Riedeliana Nees in Mart. Fl. Bras. 9: 99. 1847.

Shrub, 9 feet tall, with flexible trunk. Branches few and confined to the summit. Bark light to dark brown, with short, shallow ridges. Leaves glabrous, oblong, acute at apex, cuneate at base. Flowers with bright red corolla.—Fairly common; in thickets (alt. 380–1,500 ft.).

Wood canary yellow, streaked with pinkish brown; odorless and tasteless; straight-grained; fine-textured; of fairly light or medium weight; easy to work and takes a smooth polish. Growth rings absent or indistinct. Parenchyma indistinct. Pores minute or very small; not numerous, scattered; solitary or in small radial multiples. Vessel lines fine and of same color as background. Rays sometimes barely visible to unaided eye on moistened cross section; indistinct on other surfaces. Pith pale yellow or yellowish white.

Vessel perforations simple; vessel-ray pits large, elongated, simple to half-bordered. Rays heterogeneous; 5 cells or more wide. Wood fibers septate and with simple pits.

Loreto: Caballo-cocha, *2367;* herbarium material collected also at Tarapoto, San Martín.

2. TRICHANTHERA HBK.

Trichanthera gigantea (HBK.) Humb. & Bonpl. ex Steud. Nom. ed. 1. 708. 1821.

Straggly tree, ranging in height up to 55 feet. Crown dense, spreading. Trunk bifurcating near the base; diameter of larger limb 13 inches. Bark thin, light gray or greenish gray, smooth. Leaves opposite, subround or oval, acuminate at tip. Flowers in terminal racemes. Fruit a bilocular, oblong capsule; October–November.—Uncommon; in slightly humid loam or in the vicinity of streams (alt. 450 ft.).

Wood cream-colored or pale brown, with no sharp distinction between sap and heart; has a slightly fetid odor, but no distinctive

taste; straight- or wavy-grained; coarse-textured; light and rather soft, but strong for its weight; requires a sharp knife to cut smoothly across grain; stains readily in drying. Growth rings absent or indistinct. Parenchyma paratracheal; fairly distinct with lens. Pores at limit of vision to distinct; fairly numerous, well distributed; solitary or in small multiples; open. Vessel lines long or short, prominent; usually filled with brown or gray deposits and vessel walls rather lustrous. Rays broad and fairly distinct to prominent on cross and radial sections; heterogeneous and with coarse cells. Pith pale brown; lustrous crystals of calcium oxalate abundant.

Loreto: Sapote-yaco, lower Huallaga, *4894*.

3. SANCHEZIA Ruiz & Pavón

Shrubs or small trees. Leaves large, firm, subentire, bright green or variegated. Flowers, arranged in spikes or panicles, have tubular, small-lobed, red, yellow, or purple corolla; bracts small and inconspicuous or large and bright red or yellow. The brilliant color of the inflorescence, in contrast with the bright green of the leaves, adds to the beauty and attractiveness of the plants.

Wood pale brown; odorless and tasteless; straight-grained; moderately fine- or medium-textured; of light or medium weight; easy to cut; not durable and subject to a bluish gray stain. Growth rings absent. Parenchyma indistinct or in numerous, extremely fine, short lines extending between the rays. Pores small or fairly small; not numerous, well scattered; solitary or less frequently in small radial multiples; open. Rays moderately fine to rather distinct on cross section; sometimes distinguishable without lens on radial.

Vessel perforations simple; pits between vessels and ray-parenchyma cells large, elongated, and simple to half-bordered. Wood fibers septate and with simple pits. Rays heterogeneous.

Sanchezia rubriflora Leonard(?), Journ. Wash. Acad. Sci. 22: 135. 1932. *Topomaki.*

Tall shrub or small tree, up to 16 feet in height. Bark pale brown with a grayish tinge and numerous short or long, low ridges. Flowers in terminal spikes; corolla reddish, yellow near the tip; April–May.—Forming undergrowth in dense forest subject to periodical inundations (alt. 400 ft.).

Wood pale yellowish brown with extensive bluish gray areas or streaks; light in weight; easy to cut. Pores readily visible with lens;

rather few, uniformly distributed; solitary or in radial multiples of 2–3. Vessel lines fairly fine. Rays moderately fine or broad on cross section; occasionally distinguishable without lens on radial surface. Pith pale brown, about 0.25 inch in diameter, chambered; septa oblique.

Loreto: lower Nanay, *380*.

Sanchezia Williamsii Leonard, Journ. Wash. Acad. Sci. 22: 127. 1932. *Andara-caspi.*

Tall shrub or small tree, up to 22 feet in height. Crown flat. Trunk straight, round, slender, and unbranched for 7 or 8 feet. Bark pale brown with grayish white patches and numerous, low, fairly coarse ridges. Flowers with reddish or yellowish pink corolla; January–February.—Uncommon; in thickets or open dry patches (alt. 3,500 ft.).

Wood yellowish or pale brown; has no distinctive odor or taste; moderately straight-grained; medium-textured; of medium weight; easy to cut; not durable and subject to stain in drying. Growth rings absent. Pores fairly small; not numerous, uniformly scattered; solitary or less frequently in radial, seldom tangential, multiples of 2–3. Vessel lines fine, but visible without lens. Rays at limit of vision on moistened cross section; indistinct or barely distinguishable to unaided eye on radial.

San Martín: San Roque, *7215*.

RUBIACEAE. Madder Family

Trees, shrubs, herbs, sometimes vines. Leaves opposite or verticillate, with persistent or deciduous stipules. Flowers small or large and showy, perfect or rarely unisexual; corolla of united petals. Fruit baccate, drupaceous, or capsular, 1–10-celled; seeds 1–many, small or large, often winged. The family is represented generously in most tropical regions and is one of the largest of Peruvian flora, confined mostly to the eastern slopes of the Andes. The best known and most important members of the group in Peru are *Cinchona*, the source of cinchona bark which furnishes quinine; *Coffea arabica* L., cultivated so extensively in tropical regions; and the "capirona," *Calycophyllum Spruceanum* Hook. f., a tall tree common along the banks of the Amazon and its main tributaries and readily recognizable by its long, columnar trunk and smooth bark.

Woods brightly colored, ranging from pink to orange, but mostly dull pale brown or creamy; odorless and tasteless; usually fine-tex-

tured; heavy and hard to moderately so, and some of them may prove of value as substitutes for boxwood. Parenchyma usually sparingly developed and indistinct; in poorly defined concentric lines which may be widely spaced or close together, in others diffuse or in very short lines at right angles to the rays. Pores small or extremely small; numerous or fairly numerous and well distributed; solitary, in small radial multiples or rows, or tending to be in clusters. Rays usually fine, numerous, invisible or readily discernible on cross section; indistinct without lens on tangential; lighter- or darker-colored than background and often very distinct on radial surface.

Vessels with simple perforations; intervascular and vessel-parenchyma pits of the same size and shape; all pits vestured. Rays heterogeneous; 1–4 cells wide and up to 40 cells high. Wood fibers with simple or indistinctly bordered pits. Raphides present in the rays and sometimes in the wood parenchyma or in both in *Psychotria*, confined to the wood parenchyma cells in *Morinda*.

1. ALIBERTIA A. Rich.

Shrubs or small trees. Leaves opposite, coriaceous, glabrous or pubescent; stipules distinct. Flowers dioecious, small or medium-sized, solitary or clustered at the ends of the branches. Fruit baccate, globose, 2–5-celled, with fleshy pulp; seeds large, lenticular or subglobose. Wood is of no local value.

Wood pinkish yellow to pale brown, often streaked; heartwood sometimes well defined, reddish brown; lustrous; odorless and tasteless; straight-grained; uniformly fine-textured; heavy, hard or moderately so, and strong; easy to cut; fairly durable. Parenchyma in concentric lines of lighter color than background. Pores small; not numerous; solitary or in small radial multiples; open. Rays fine, sometimes barely visible without lens on cross section; invisible to unaided eye on other surfaces; heterogeneous.

Alibertia edulis (L. Rich.) A. Rich.(?), ex DC. Prodr. 4: 443. 1830.

Slender, glabrous tree, from 10 to 25, seldom 35, feet in height. Crown spreading. Trunk straight and cylindrical. Bark reddish brown, fissured, and stringy. Leaves short-stalked, lustrous, coriaceous, the blades ovate or lanceolate-oblongate, acuminate, acute or rounded at base. Flowers clustered at end of branches, sessile, those of the two sexes on separate plants; corolla white. Fruit a globose berry, yellow and fleshy at maturity, said to be edible although it has a disagreeable taste; seeds large, numerous, com-

pressed.—Common in inundated land or in thickets (alt. 400–1,500 ft.).

Wood variable in color from pale brown to pinkish gray, with purplish or grayish streaks; somewhat lustrous when held to proper light; straight- or interlocked-grained; uniformly fine-textured; hard, heavy, strong, and tenacious; takes a smooth finish; fairly durable. Growth rings present. Parenchyma abundantly developed and distinct; in concentric lines of lighter color than background. Pores small and barely distinguishable with lens; not numerous; solitary or in radial multiples of 2; open. Vessel lines short and fine. Rays numerous and faintly distinguishable to aided eye on cross section; barely visible with lens on tangential; of same color as background on radial surface; heterogeneous.

San Martín: Tarapoto, *6112;* Juan Guerra, *6869.*—Loreto: near Iquitos, *8061.*

Alibertia stenantha Standl. Field Mus. Bot. 8: 170. 1930.

Tall shrub or small, slender tree, from 9 to 18 feet in height. Leaves membranaceous or subcoriaceous, oblong or elliptical-oval, abruptly acuminate, sharply acute to rounded at base. Corolla white or yellow. Fruit globose, glabrous, dark brown when mature. —Frequent throughout the lowland (alt. 350–400 ft.); in thickets or clearings in slightly humid soil.

Wood pinkish yellow and lustrous; straight-grained; uniformly fine-textured; moderately hard, heavy, and strong.

Loreto: Caballo-cocha, *2225;* La Victoria, *2941, 3116, 3154, 3168.*

2. ALSEIS Schott

Alseis peruviana Standl. Field Mus. Bot. 11: 179. 1936. *Mishoquiro, Muela de gato, Palo blanco.*

Forest tree, from 30 to 80 feet in height. Crown spreading. Trunk straight, cylindrical, from 8 to 14 inches in diameter, and clear of branches up to two-thirds the height. Bark thin, yellowish to dark reddish brown, and with coarse scales. Leaf blades lanceolate, pubescent, short-stalked, dark brown on the upper surface, dark green beneath. Flowers small, pale yellowish white, in elongate spikes; October–November. Capsule oblong-turbinate, 2-celled.—Fairly abundant in the lower and upper Huallaga regions (alt. 450–1,500 ft.); in moderately scanty growth. Wood is used for doorframes, window sashes, house posts, and other purposes demanding durability and strength.

Sapwood almost white to uniform pale yellow and suggesting West Indian boxwood (*Casearia praecox* Gris.); heartwood thin, reddish brown, not resistant to insect attacks. Wood odorless and tasteless; straight-grained; uniformly fine-textured; heavy, strong, and moderately hard; takes a smooth polish with a moderate luster and holds its place well when finished. Growth rings indicated by fine bands of terminal parenchyma. Pores distinguishable with lens; numerous, well distributed; solitary or in radial rows of 2–4, frequently in small clusters; open. Vessel lines fine and indistinct. Rays distinguishable to aided eye on cross section; indistinct on tangential; fairly distinct at times on radial surface.

Loreto: lower Huallaga, *5030.*—San Martín: Juan Guerra, *6916.*

3. ANISOMERIS Presl

Anisomeris paniculata (Bartl.) Standl. Field Mus. Bot. 4: 293. 1929. *Cunshi-cashan, Cunshi-huacran.*

Small, forest tree, up to 35 feet in height. Crown spreading or flat. Trunk straight, compressed or cylindrical, slender, and free of branches up to 15 feet; twigs appressed-pilose. Bark thin, pale gray to grayish brown. Leaves oval or ovate-lanceolate, acuminate, acute or obtuse at base, pubescent. Flowers in long-stalked cymes; calyx deeply lobate; corolla tomentulose. Fruit containing a very hard stone.—Fairly abundant in the lowland and in the Department of San Martín (alt. 400–2,500 ft.). The durable timber is suitable for house construction.

Sapwood pale brown with a grayish tinge; heartwood dull brown. Wood medium in weight, fairly hard, and strong; takes a high polish with a satiny luster. Growth rings absent or poorly defined. Pores numerous, scattered; solitary or in radial multiples of 2–4, infrequently in tangentially disposed pairs or in small clusters; open. Vessel lines appear as fine scratches. Rays barely at limit of vision on cross surface; distinguishable only with lens on tangential; of same color or slightly darker than background on radial.

Loreto: San Antonio, upper Itaya, *3503.*—San Martín: Tarapoto, *5617;* San Roque, *7142.*

4. BERTIERA Aubl.

Bertiera guianensis Aubl. Pl. Guian. 1: 180. *pl. 69.* 1775.

Slender shrub, from 4 to 12 feet tall. Crown conical. Bark thin, light brown, scaly. Branches densely and somewhat roughly pubescent. Leaves short-stalked or almost sessile, blades oblongate to

ovate, lanceolate, acuminate, acute or rounded at base. Flowers small, sessile, in one-sided cymes, these arranged in large terminal panicles; corolla white or greenish white. Fruit a round drupe, glabrate or sparsely pilose, ribbed, bluish black when ripe; seeds yellow.—Common in dry loam in scant forest growth throughout Loreto and on the plain of Tarapoto (alt. 400–1,400 ft.); widely distributed in Central and northern South America.

Sapwood pale yellowish or white and fairly lustrous; heartwood purplish. Wood has no distinctive odor or taste, straight- or interlocked-grained; uniformly fine-textured; of medium weight, compact, strong; takes a smooth finish. Growth rings indistinct or absent. Parenchyma not visible with lens. Pores small and barely distinguishable to aided eye; not numerous; mostly open. Vessel lines fine. Rays distinguishable or indistinct with lens.

Loreto: Pebas, *2045*.

5. BOTHRIOSPORA Hook. f.

Bothriospora corymbosa (Benth.) Hook. f. Ic. Pl. 11: 55. *pl. 1069*. 1870. *Quinilla*.

Tree, 70 feet in height. Crown open; branches slender. Trunk straight, round, slender, and from 8 to 16 inches in diameter. Bark reddish brown, thin, smooth; inner bark fibrous or separates into coarse flakes. Leaves opposite, stalked. Fruit baccate, small, yellow when mature; seeds numerous; maturing in April–May.—Common in the vicinity of Iquitos (alt. 400 ft.); along banks of streams or in periodically flooded forest.

Wood grayish brown; odorless and tasteless; straight- or roey-grained; medium-textured; fairly heavy; not difficult to work and takes a moderately smooth finish; checks in drying; durable. Growth rings present owing to slight variation in depth of color. Parenchyma indistinct. Pores fairly small; rather numerous and uniformly distributed; solitary or in small radial multiples; often closed. Vessel lines fine, but readily visible owing to white deposit of calcium frequently present. Rays fine, sinuous, lighter-colored than adjacent fibers, and barely at limit of vision on cross section; visible with lens on tangential; barely discernible to unaided eye on moistened radial.

Loreto: Río Masán, lower Itaya, *118, 119*.

6. CALYCOPHYLLUM DC.

Calycophyllum Spruceanum (Benth.) Hook. f. ex Schum. in Mart. Fl. Bras. 6, pt. 6: 191. *pl. 106*. 1889. *Capirona*.

One of the most ubiquitous as well as one of the most handsome trees in the Peruvian Amazon basin, often attaining a height of 90 and occasionally up to 150 feet. Crown spreading or at times cone-shaped. Trunk straight, cylindrical, from 25 to 35 inches in diameter, and free of branches up to three-fourths its height. Bark smooth, deciduous, of a grayish green color when newly formed, becoming coppery brown with age. Leaves opposite, subcoriaceous, entire, long-petiolate, glabrous. Inflorescence in terminal cymes; flowers small but conspicuous, pale yellow, and fragrant; corolla somewhat grayish and densely pubescent. Capsule ellipsoid, pale brown, 2-celled, dry when ripe, up to 0.3 inch long; seeds small, winged.—Common along the banks of the main stream and its principal tributaries, usually in inundated or swampy areas. Its timber is the most common firewood of the Amazon Valley, where it is consumed in enormous quantities by river launches. It is used also for furniture and general construction.

Sapwood thick, pinkish brown; heartwood dull brown. Wood slightly lustrous; tasteless and odorless; straight- or irregular-grained; uniformly fine-textured; heavy and strong; easy to work and takes a smooth finish. Growth rings indistinct. Parenchyma not distinguishable. Pores discernible only with lens; numerous, uniformly scattered, and not crowded; solitary or in radially or tangentially arranged pairs; open. Vessel lines fine and short. Rays at limit of vision on moistened cross surface; visible with lens on tangential; of same color as background on radial surface.

Vessels with simple perforations; intervascular pits small and rather numerous; vessel-ray pits half-bordered, often in reticulate arrangement. Rays decidedly heterogeneous; 1–4 cells wide and few to 30 cells high. Wood fibers in radial rows; pits bordered, few, and inconspicuous.

Loreto: lower Nanay, *455;* La Victoria, *2855, 3010;* near Iquitos, *8033.*

7. CAPIRONA Spruce

Capirona decorticans Spruce, Journ. Linn. Soc. 3: 200. 1859. *Capirona negra.*

Slender, forest tree, about 40 feet tall. Crown spreading. Trunk straight, cylindrical, and free of branches for three-fourths the height. Bark fairly thick, dark purplish brown or almost black, smooth or with shallow fissures. Leaves almost sessile, glabrous, oblong to broadly elliptic, obtuse or short-acuminate. Flowers in

large terminal panicles; corolla red; one of the calyx lobes often expanded into a large red limb. Capsule woody, 1 inch long, greenish yellow.—Abundant; in open light loam (alt. 1,400 ft.). Timber is used for general carpentry and fuel.

Wood uniform pinkish brown with a grayish tinge; tasteless and odorless; straight-grained; uniformly fine-textured; heavy and strong; easy to work and takes a smooth finish; durable. Growth rings poorly defined or absent. Parenchyma not visible. Pores distinguishable only with lens; fairly numerous and well distributed; mostly solitary, also in radial multiples or rows of 2–3; open. Vessel lines short and fine. Rays fine and barely at limit of vision on cross section; indistinct on tangential; of same color as background, but discernible, on radial surface.

San Martín: Tarapoto, *6070*.

8. **CEPHAELIS** Swartz

Shrubs or small trees. Leaves opposite, stalked, glabrous or pubescent; stipules united in a short sheath. Flowers in dense heads and surrounded by an involucre of large, leaf-like, green or colored bracts, a characteristic feature of the genus. Fruit a rather fleshy, 2-seeded drupe; seeds vertical. Fairly common in the lowland, usually in dry patches or in wooded swamps, and exceptionally conspicuous and showy when in flower.

Wood pale brown with a faint grayish tinge, sometimes streaked; odorless and tasteless; straight-grained; fine-textured; easy to cut and takes a smooth, fairly lustrous polish. Growth rings absent or present. Parenchyma indistinct with lens. Pores minute or small; fairly numerous and uniformly scattered; solitary or in small radial multiples or rows; open or closed. Vessel lines not visible without lens. Rays numerous and slightly wavy on cross section, the larger ones readily distinguishable with lens; slightly darker than background and discernible without lens on radial surface.

Cephaelis rosea Benth. in Hook. Journ. Bot. 3: 224. 1841. *Sufia, Yaco-sisa blanca.*

Shrub, up to 6 feet tall. Leaf blades ovate-lanceolate or elliptic-oblong, long-acuminate, acute or attenuate at the base. Bracts green or purplish. Fruit blue, globose.—Fairly common in the lower Nanay (alt. 400 ft.); forming undergrowth in dense forest.

Loreto: lower Nanay, *765*—herbarium material only.

Cephaelis tomentosa (Aubl.) Vahl, Eclog. Amer. 1: 19. 1796.

Slender, straggly shrub, about 6 feet tall. Leaves pubescent above, membranaceous, short-stalked, lanceolate to ovate-elliptic, and with long tip. Flowers in terminal heads, stalked, dense, many-flowered; bracts red, large, and exceeding the flowers; corolla yellow; flowering in June–July. Fruit purplish blue, small, ovoid, and somewhat compressed.—In dry open patches in dense forest growth (alt. 400–4,000 ft.); very showy and handsome when in blossom.

Sapwood pinkish brown; heartwood grayish. Wood straight-grained; fine-textured.

Loreto: La Victoria, *2964*.

Cephaelis Williamsii Standl. Field Mus. Bot. 8: 185. 1930.

Uncommon, glabrous shrub, from 10 to 12 feet tall, with slender branches. Bark dark brown, smooth. Leaves slender-stalked, the blades membranaceous. Flowers blue; May–June. Fruit ovoid, globose.—Fairly common in the lowland (alt. 400–500 ft.); along banks of streams or in semi-humid loam in forest growth.

Loreto: upper Itaya, *1123*.

9. CHIMARRHIS Jacq.

Chimarrhis Williamsii Standl. Field Mus. Bot. 8: 162. 1930. *Tuwara, Yaco-caspi.*

Tree, from 35 to 50 feet in height. Crown open. Trunk straight, 11 to 14 inches in diameter, and branching from near the base. Bark pale yellowish or light grayish brown, fairly smooth. Leaves opposite, short-stalked, rather leathery; stipules deciduous or persistent. Flowers axillary, very small; corolla white, fragrant; May–June. Capsule small, septicidally dehiscent; seeds numerous, minute.—Not common; in open patches among shrubs and small trees, frequently in the vicinity of abodes (alt. 400 ft.). Timber is used for general carpentry and fuel.

Sapwood well defined, variable in color from pale yellow to light brown, often with a pale greenish cast; heartwood dull brown, thin. Wood odorless and tasteless; roey- or interlocked-grained; moderately fine-textured; not easy to work, but takes a fairly smooth, lustrous finish; liable to check in drying; durable. Growth rings absent or poorly defined. Parenchyma indistinct. Pores distinguishable only with lens; fairly numerous and well distributed; solitary or in small radial multiples or rows, infrequently in small clusters; mostly open. Vessel lines fine, of same color as background,

and barely at limit of vision; lustrous tyloses or grayish white deposit frequently present. Rays at limit of vision on cross and radial sections.

Loreto: lower Nanay, *369, 409* (type); collected also near mouth of Río Santiago, middle Marañón.

10. CINCHONA L.

Trees or shrubs, glabrous or variously pubescent; stipules large and distinct. Inflorescence terminal, paniculate, with opposite branches, usually many-flowered; corolla regular. Capsule ovoid or oblong to subcylindric, dehiscent from base to apex, many-seeded; seeds winged, vertically imbricate.

Next to the genus *Coffea*, that produces the coffee of commerce, the most important group of the family Rubiaceae is the genus *Cinchona*. From the bark of trees of this genus is obtained the drug quinine, used in medicine as a specific for malarial fever. The distribution of the genus extends from the Bolivian province of Cochabamba, through Yungas and Munecas into the Peruvian province of Caravaya, thence in the forests along the eastern slopes of the Peruvian Andes, continuing northward through the Ecuadorean forests on the western slopes of Chimborazo, through the province of Popayan, and along the slopes of the Colombian Andes.

Those who wish to inform themselves upon the discovery and habitat of cinchona trees are recommended to read Sir Clements R. Markham's Peruvian Bark (London, 1880), which furnishes a well-written account on the subject as well as an extensive bibliography.

According to Markham, the aborigines of South America, except perhaps in one locality, appear to have been ignorant of the virtues of Peruvian bark. It is mentioned neither by the Inca Garcilasso de la Vega nor by Acosta in their lists of Indian medicines. It seems probable, nevertheless, that the Indians were aware of the medicinal value of Peruvian bark in the neighborhood of Loja, 230 miles south of Quito, where its use was first made known to Europeans. The Quechua name for the tree, "quina-quina" (bark of bark), indicated its special importance.

In 1638, the wife of Don Luis Bobadilla, fourth Count of Chinchón, and at the time Viceroy of Peru, suffered from an intermittent fever. News of her illness reached one Don Juan Lopez, Spanish Corregidor of Loxa, Ecuador, who dispatched a parcel of powdered bark to her physician, Doctor Juan de Vega, which was tried and effected a rapid and complete cure. When the Count of Chinchón

returned to Spain in 1640, his wife took with her samples of the bark and thus she was the first person to introduce the remedy into Europe. To commemorate the service rendered by the countess, Linnaeus, 100 years later, named the genus which yields the bark *Chinchona*. In recent years the generic name has been misspelled by dropping the *h* of the first syllable, thus defeating the purpose Linnaeus had in mind.

A few years later, the Count of Chinchón was instrumental in sending an expedition from Quito to the estuary of the Amazon. In the party was a Jesuit priest, Acuña, who spread the knowledge of the curative properties of the bark among the brethren of the order throughout Europe and thus it became known as "Jesuit's bark." Under the name of Peruvian bark and "quina-quina" its use gradually spread and by the middle of the eighteenth century its virtue was generally conceded by the medical authorities of Europe.

The first description of the tree was given as a result of a French expedition to South America, headed by La Condamine. In the party was Joseph de Jussieu who set out in 1739 from Quito to study the "quina-quina" tree. In the Mémoires de l'Academie, La Condamine described the tree and in 1742 Linnaeus, as previously stated, established the genus *Chinchona*.

For more than a hundred years the "quina-quina" bark found in the forests and transported to the Peruvian port of Paita was the only species with which botanists were familiar. The high price at which it was sold led to improvidence in the collection of the bark, the trees being felled in great numbers in order to obtain the product. Owing to the lack of a dependable and constant supply and the realization that continuance of the depredations in collecting the product would result in its extinction, plans were made in 1859, under the direction of the British government, to establish cinchona trees in the Nilgiri Hills and elsewhere in India. The best authorities available, such as Markham and others, were selected for this work and seeds and plants were gathered in all the principal centers of production. Richard Spruce, who, through several years of collecting along the Amazon and in the Andes, became familiar with the vegetation of those regions, was entrusted with the collection of cinchona in the Chimborazo region. A full account of his explorations is given in his Notes of a Botanist on the Amazon and Andes.

The cinchona trees of Peru and adjacent territories have become so scarce, through the continued practice of felling the trees, that the

export of the bark no longer forms an appreciable source of revenue to the republic. Since the introduction of the trees into India, Ceylon, and Jamaica by the English, and into Java by the Dutch, large areas have been cleared for plantations which furnish a constant supply of this valuable commodity. The success of these plantations demonstrates the fact that the forest-grown product cannot compete with the same commodity produced scientifically and economically by cultivation.

Cinchona amazonica Standl. Field Mus. Bot. 8: 334. 1931.

Small, slender tree or shrub, approximately 12 feet high. Branches only at the top. Trunk straight and round. Leaves rather membranaceous, obovate-elliptic. Fruit ovoid, dark green; July–August.—Not common; in sandy loam in open patches in forest (alt. 350 ft.).

Loreto: Pebas, *1747*.

Cinchona officinalis L. Sp. Pl. 172. 1753. *Capirona del bajo, Cascarilla amarilla, Quina-quina.*

Medium-sized tree, up to 40 feet or more in height. Crown spreading or, at times, almost flat or round. Trunk straight, cylindrical, about 8 inches in diameter, and clear of branches for half the height. Bark thin, dark chocolate brown, fairly smooth or rugose, lustrous when held to proper light, and is or has been an important source of quinine. Leaves stalked, lanceolate to elliptic or ovate, small, acute, acuminate, or obtuse, attenuate to rounded at base, subleathery. Calyx reddish, glabrous or nearly so; corolla pink or red. Capsule oblong.—In open patches in forest, frequently in humid loam or along banks of streams (alt. 450–1,500 ft. or more). Wood is used for furniture, general carpentry, and fuel.

Sapwood uniform yellowish or pale brown; heartwood dull pinkish brown. Wood tasteless and odorless; straight- or interlocked-grained; uniformly fine-textured; rather heavy, strong, and compact; moderately easy to work and takes a smooth finish; probably durable. Growth rings absent or indistinct. Parenchyma not visible with lens. Pores of medium size; not crowded; mostly solitary, also in radial rows of 2–3, seldom in tangentially disposed pairs; open. Vessel lines appear as fine, short or long scratches, of same color as the adjacent elements; tyloses abundant. Rays fine, evenly spaced, and distinguishable only with lens on cross section; indistinct on tangential; barely at limit of vision on radial surface.

Loreto: lower Huallaga, *4486*.

11. COFFEA L.

Coffea arabica L. Sp. Pl. 172. 1753. *Café.*

Native of tropical Africa, the coffee shrub is planted on a limited scale in both the lowland and highland, at elevations up to about 3,500 ft. Infrequently, half-wild sprouts are found in thickets and forest, the seeds probably having been carried by birds. Flowers in clusters of 3–7 in the leaf axils, sessile. Fruit subglobose, indehiscent, reddish at maturity.

Loreto: lower Itaya, *218;* Pró, near Pebas, *1966;* La Victoria, *2736.*—San Martín: Tarapoto, *6099.*

12. CONDAMINEA DC.

Condaminea corymbosa (Ruiz & Pavón) DC. Prodr. 4: 402. 1830. *Sauco.*

Straggly shrub or small, subxerophytic tree. Leaves very large, oblong or obovate, nearly sessile, glabrous. Flowers in rather large terminal panicles; calyx dehiscing; corolla tube creamy white below, red above; staminal filaments and style green; anthers brown. Capsule bisulcate; seeds compressed, angled.—Common on open hillsides (alt. 3,000 ft.).

San Martín: San Roque, *7794*—herbarium material only.

13. COUSSAREA Aubl.

Shrubs or trees, usually glabrous. Leaves opposite or rarely verticillate, short-stalked or subsessile, more or less leathery, lanceolate-oblong to elliptic. Inflorescence terminal; flowers short-stalked; corolla lobes valvate. Drupe ovoid or globose, 1-seeded, with thin septum, rupturing easily; seeds laterally or basally attached.

Wood grayish white or oatmeal-colored to dark brown, often streaked; sometimes well defined into sap and heart; odorless and tasteless; straight- or fairly straight-grained; fine- to medium-textured; moderately light to heavy, strong, and compact; easy to cut; sometimes fairly durable. Parenchyma indistinct. Pores minute or small; fairly numerous and well distributed; solitary or in small radial multiples or rows; mostly open. Rays prominent and wavy on cross section; invisible to unaided eye on tangential; sometimes rather conspicuous on radial surface.

Coussarea brevicaulis Krause, Bot. Jahrb. 40: 142. 1907; Verh. Bot. Ver. Brandenb. 50: 117. 1908.

Shrub, from 8 to 12 feet tall. Bark 0.25 inch thick, scarlet brown, rugose. Fruit ovoid, pale yellow when mature; March–April.—Fairly common in the lowland (alt. 400 ft.); in dry or humid loam in pastures or along margin of forest.

Sapwood greenish gray or pale grayish brown; heartwood pinkish brown. Wood straight- or interlocked-grained; fine- to medium-textured; of medium weight; easy to cut.

Loreto: Caballo-cocha, *2310;* lower Itaya, *8175.*

Coussarea hirticalyx Standl. Field Mus. Bot. 8: 175. 1930.

Slender tree of the lowland, up to 25 feet tall. Crown spreading. Trunk straight, cylindrical, and branching from near the base. Bark 0.5 inch thick, purplish brown, scaly. Flowers with brown calyx, fragrant; June–July.—Common; in slightly humid or dry loam along margin of dense forest (alt. 380 ft.). Timber is used locally for rough carpentry and general construction.

Sapwood not sharply defined, dark brown, often with dark purplish streaks; heartwood pale pinkish. Wood odorless, but slightly bitter; straight- or interlocked-grained; uniformly fine-textured; heavy, strong, and compact; fairly easy to work and takes a smooth, lustrous finish; liable to check in drying; durable. Rays wavy and distinguishable without lens, but not prominent, on cross section.

Loreto: Caballo-cocha, *2406, 2504;* La Victoria, *2528.*

Coussarea megalocarpa Standl. Field Mus. Bot. 8: 366. 1931.

Slender tree, rarely exceeding 25 feet in height. Trunk moderately straight, cylindrical, and free of limbs for 4 feet or so. Fruit soft, oval, in clusters of 3, pale brown when mature; March–April. —Fairly common; in moderately dense forest (alt. 400 ft.).

Wood grayish white throughout, often streaked with extensive dark purplish brown; straight-grained; moderately fine-textured; rather heavy, strong, but perishable in contact with soil. Rays evenly spaced, white, the larger ones rather prominent and readily distinguishable on cross section.

Loreto: lower Itaya, *8171.*

Coussarea ovalis Standl. Field Mus. Bot. 8: 367. 1931. *Chonchuela.*

Medium-sized, slender tree, often up to 36 feet or more in height. Crown spreading. Trunk straight, cylindrical, and clear of limbs for half the height. Leaves petiolate, glabrate, the blades oblong or

elliptic, abruptly acuminate, acute or rounded at base. Inflorescence terminal; flowers small, white, fragrant; August–September.—Not common; in dense flood-free forest (alt. 400 ft.). Wood is not used locally.

Wood uniform white or oatmeal-colored throughout, turning to pale brown or yellowish on exposure; odorless and tasteless; interlocked- or wavy-grained; uniformly fine-textured; of medium weight to rather heavy; cuts easily and takes a smooth finish; checks in drying; not durable. Growth rings absent or barely visible owing to slight variation in depth of color. Parenchyma not discernible with lens. Pores minute or small; rather numerous and well scattered; solitary or, less frequently, in small radial or tangential multiples or rows; mostly open. Vessel lines of same color as background, occasionally visible as very fine scratches. Rays wavy and prominent on cross section; indistinct on tangential; rather conspicuous on radial surface; heterogeneous.

Loreto: upper Itaya, *3355*.

Coussarea tenuiflora Standl. Field Mus. Bot. 4: 331. 1929. *Motelo-micuna, Nucñu-huito, Supai-caspi.*

Nearly glabrous, slender tree, up to 30 feet in height. Crown spreading or almost conical. Trunk straight or moderately so, cylindrical, either branching from near the base or clear of limbs up to half the entire height. Bark greenish when fresh, in dry material becoming light gray or almost black with age, and with long, shallow fissures. Leaf blades subleathery, ovate or oblongate, slightly puberulent above along midrib and costal veins, acuminate or acute, usually rounded at base. Fruit dark brown when mature.—Abundant in the lowland (alt. 380–500 ft.); in forest not subject to inundations; type material collected by Spruce at Tarapoto. Wood has no local application except for fuel.

Sapwood not clearly demarcated, ranging from almost white to pale brown with long purplish or pinkish streaks; heartwood pale greenish or light brown. Wood rather light in weight; slightly lustrous when held to proper light. Rays of a pronounced white color and often readily distinguishable on cross section; of same color or slightly darker than background on radial surface. Some indications of what appear like intercellular canals present in some specimens.

Loreto: upper Itaya, *891;* lower Huallaga, *4622, 5177, 7830;* Iquitos, *8152*.

Coussarea tricephala Standl. Field Mus. Bot. 8: 368. 1931.

Stout shrub, up to 18 feet in height. Crown dense. Bark pale gray to dark brown, with numerous, short, deep, vertical fissures. Leaf blades elliptic or elliptic-lanceolate, acuminate, acute at base, puberulent along veins on upper surface, glabrous beneath. Flowers white; December–January.—Fairly common; in sandy loam in secondary growth (alt. 1,300–1,600 ft.).

Wood white, streaked with pale pink; rather hard, heavy, and tough; probably durable.

San Martín: Tarapoto, *6533;* herbarium material collected also at Lamas.

14. COUTAREA Aubl.

Coutarea hexandra (Jacq.) K. Schum. in Mart. Fl. Bras. 6, pt. 6: 196. 1889. *Huacamayo-caspi.*

Tree, up to 120 feet in height. Crown flat. Trunk straight, cylindrical, from 20 to 36 inches in diameter, free of branches up to 30 feet, and with small buttresses. Bark 1 inch thick, yellowish or grayish brown, fairly smooth, and yields when cut a small amount of reddish or yellowish, bitter resin, reputed to be employed in domestic medicine as a substitute for quinine. Leaves opposite, stalked, lanceolate, oblong, or broadly ovate to elliptic, short-acuminate, glabrous or nearly so; stipules persistent. Inflorescence terminal, few-flowered; corolla deep pink or purplish white. Capsule woody, strongly compressed, dark brown, 2-celled, septicidally bivalvate; seeds imbricate, broadly winged.—Of limited distribution; in dense forest subject to seasonal inundations (alt. 400 ft.). The dense wood is esteemed locally for house posts, furniture, and general carpentry.

Wood uniform pinkish brown throughout, turning to yellowish brown soon after exposure to air; odorless, but bitter to taste; straight- or interlocked-grained; uniformly fine-textured; heavy, strong, and compact; fairly easy to work, takes a smooth finish, and holds its place well; fairly durable. Growth rings occasionally present owing to variation in depth of color. Parenchyma not distinguishable with lens. Pores discernible only with lens; numerous and evenly distributed; solitary, infrequently in small tangential or diagonal multiples; open or closed. Vessel lines very fine and short; lustrous tyloses frequently present. Rays barely at limit of vision on cross section; indistinct on tangential and radial surfaces.

Loreto: Río Masán, lower Itaya, *158.*

15. DUROIA L. f.

Shrubs or trees, unarmed, with thick branchlets. Leaves opposite or verticillate, petiolate, chiefly coriaceous; stipules forming a conical cap and deciduous above a circular slit. Inflorescence terminal; flowers dioecious, the staminate in cymes, the pistillate usually solitary, rarely 2–3 in a head. Fruit large, baccate; seeds rounded, trigonous, compressed, with fibrous, reticulate testa.

Wood white or pale pink when fresh, becoming pinkish brown and at times streaked when dried; odorless and tasteless; straight-grained or fairly so; uniformly fine-textured; heavy or moderately heavy, hard, and strong; easy to work and capable of taking a smooth, lustrous finish; durable. Parenchyma indistinct. Pores small; numerous and uniformly scattered; solitary or in small radial multiples or rows; mostly open. Rays indistinct or barely visible without lens on cross section; invisible to unaided eye on other surfaces.

Duroia hirsuta (Poepp. & Endl.) K. Schum. in Mart. Fl. Bras. 6, pt. 6: 367. 1889. *Palo de diablo, Supai-caspi, Supai-quinilla.*

Tree, about 25 feet high, but said to attain greater stature. Trunk cylindrical, slender, and free of branches for approximately 9 feet. Bark thin, reddish or dark brown. Leaves obovate-oblong, cuspidate, acuminate, hispid especially along the midrib. Flowers in dense terminal cymes, white, subsessile; staminate flowers in clusters, pistillate, solitary. Fruit baccate, ellipsoid-globose.—Fairly common; in dense forest not subject to periodical inundations (alt. 450–500 ft.); collected also near the estuary of the Santiago River, middle Marañón. The dense wood is esteemed for posts in the construction of huts.

Wood pale pink or mauve when freshly cut, uniform pinkish brown throughout when dried; odorless and tasteless; straight- or interlocked-grained; uniformly fine-textured; heavy, strong, tenacious, and compact; easy to work and capable of taking a smooth polish; durable. Growth rings barely distinguishable owing to slight variation in density of fibers. Parenchyma not discernible. Pores small; numerous, well scattered; solitary or in radial multiples or rows of 2–3; mostly open. Vessel lines short, fine, and barely visible without lens. Rays indistinct or faintly distinguishable on all surfaces.

Loreto: upper Nanay, *759;* San Antonio, upper Itaya, *3501.*

Duroia longifolia (Poepp. & Endl.) K. Schum. in Mart. Fl. Bras. 6, pt. 6: 365. 1889. *Pamparemo-caspi.*

Forest tree, up to 45 feet or more in height. Crown spreading. Trunk straight, cylindrical, from 6 to 10 inches in diameter, clear of branches for approximately one-third the height, and with low buttresses. Bark pinkish or pale brown, scaly. Leaves entire, stalked; blades oblanceolate, nearly glabrous, smooth, subcoriaceous, acuminate, cuspidate. Fruit brown, globose.—Moderately abundant (alt. 400 ft.); in dense forest. Wood is used to a small extent for house construction and furniture.

Wood uniform pinkish or pale yellow, darkening slightly on exposure; interlocked-grained; uniformly fine-textured, although not as fine as *D. hirsuta;* heavy, hard, strong; capable of taking a smooth finish; not resistant to insect attacks. Rays slightly more pronounced on cross section than in *D. hirsuta.*

Loreto: lower Itaya, *30, 162;* upper Itaya, *3373.*

Duroia trichocarpa Standl. Field Mus. Bot. 8: 353. 1931.

Tree, up to 40 or 45 feet tall. Crown spreading. Trunk often bent, cylindrical, from 7 to 10 inches in diameter, and clear of branches up to 20 feet. Bark light to dark brown; inner bark white. Twigs pubescent. Leaves opposite, long-stalked; blades subcoriaceous, oblong or ovate, acuminate, attenuate or obtuse at base, hirsute especially beneath. Inflorescence short. Fruit ovoid or globose, rufous, hispid.—Of limited distribution; in dense, flood-free forest (alt. 500 ft.). Wood has no local application.

Wood pale pinkish brown or almost white throughout, sometimes with purplish streaks, and darkening slightly on exposure; straight-grained; coarser-textured than *D. hirsuta;* moderately heavy, but brittle; cuts easily and takes a fairly smooth, lustrous finish; liable to check in drying; not very durable. Vessel lines appear as fine scratches. The larger rays readily distinguishable to unaided eye on cross section and faintly visible without lens on radial surface; heterogeneous.

Loreto: upper Itaya, *3470.*

16. FARAMEA Aubl.

Glabrous shrubs or trees. Leaves opposite, stalked or subsessile, usually leathery, lanceolate or oblong, acuminate or caudate; stipules often long-sheathing. Inflorescence terminal or axillary, few- or many-flowered; flowers medium-sized, in corymbs. Fruit baccate or almost dry, by abortion 1-seeded; seeds horizontal, globose or reniform.

Sapwood pale white or yellowish to pinkish brown; heartwood sometimes well defined, dull or reddish brown. Wood occasionally has a spicy odor when fresh; straight- or moderately straight-grained; fine- to medium-textured; of medium density to heavy and compact; takes a smooth, lustrous polish. Parenchyma paratracheal or in fine lines extending between the rays, infrequently appearing to indicate limit of growth rings; not distinct with lens. Pores minute, small, or medium-sized; fairly numerous and well scattered; solitary or in small radial multiples or rows; open or closed. Rays apparently of two sizes, the larger often distinguishable to unaided eye on cross section; frequently darker than background and producing silver grain on radial surface.

Faramea amplifolia Standl. Field Mus. Bot. 8: 177. 1930.

Tree, up to 45 feet tall. Crown spreading or conical. Trunk fairly cylindrical, often compressed, slender, 7 inches or more in diameter, and clear of limbs up to 12 feet. Bark thin, pale or dark reddish brown, fairly smooth or with numerous, shallow fissures. Leaf blades short-petiolate, narrowly oblong or ovate, abruptly acuminate, acute or rounded at base, coriaceous, glabrous; petiole glabrous, brown, and fairly stout. Inflorescence terminal, pedunculate; flowers bright blue; May–June. Fruit pale brown, subglobose. —Fairly common in the lowland (alt. 380–550 ft.); in dense forest, most frequently in humid loam. Wood is not used locally.

Sapwood yellowish when fresh, turning to pinkish brown on exposure, with extensive grayish brown areas; heartwood dull reddish brown. Wood has a spicy odor when freshly cut, odor and taste not distinctive in dried material; straight- or wavy-grained; fine- or medium-textured; of medium weight to rather heavy, but rather brittle; easy to cut and takes a smooth, highly lustrous finish; fairly durable. Growth rings absent or poorly defined. Parenchyma not visible or in indistinct sheaths around pores. Pores of small to medium size; not numerous, well distributed; solitary, less frequently in radial multiples or rows, infrequently in tangential pairs; mostly open. Vessel lines fine, rather long, and of same color as background or filled with pale grayish deposit. Rays apparently of two sizes, the larger sinuous and distinguishable to unaided eye on cross section; discernible without lens also on tangential; darker than adjacent elements and producing a silver grain on radial surface.

Loreto: Pebas, *1575*, *1946* (type).

Faramea anisocalyx Poepp. & Endl. Nov. Gen. & Sp. 3: 28. 1845. *Uchu-sanango.*

Small tree, seldom exceeding 20 feet in height. Crown spreading; branches slender. Trunk bent, slender, and free of branches for almost half the entire height. Bark pale gray or greenish brown, fairly smooth or with small scales. Leaves subsessile; blades narrowly oblong to oval, acuminate, acute or rounded at base, coriaceous, glabrous. Inflorescence terminal; bracts pale sky blue and very showy. Fruit white, 1-seeded; May–June.—Common throughout the lowland; in dry medium loam, most frequently in old clearings (alt. 350–500 ft.); reported also in dense forest at Cahuapanas along the Pichis Trail (alt. 1,300 ft.). Wood is used only for fuel.

Wood pale yellow or yellowish white, sometimes with a grayish tinge or extensive brownish areas when dried; of medium weight; easy to work; liable to check in drying.

Loreto: upper Nanay, *1330;* Pebas, *1898;* collected also at Caballo-cocha, La Victoria, and in the lower Huallaga.

Faramea capillipes Muell. Arg. Flora 58: 474. 1875. *Choleta-caspi, Kikinkaka.*

Shrub, approximately 15 feet tall, and often straggly. Bark pale brown or greenish brown, fairly smooth. Leaves short-petiolate; blades narrowly oblong or obovate, long-acuminate, attenuate at base, glabrous. Inflorescence terminal; flowers orange-colored or white. Fruit globose, 1-seeded.—Limited in its distribution; in open, dry patches (alt. 400–500 ft.); reported also from the estuary of the Santiago River, an affluent of the Marañón.

Sapwood pale brown, indistinctly demarcated; heartwood slightly darker brown. Wood of medium weight, compact, tough, and fairly lustrous. Growth rings visible. Parenchyma paratracheal and terminal. Larger rays distinguishable to unaided eye on cross section; slightly darker than background and distinct on radial section.

Loreto: lower Nanay, *753;* upper Nanay, *1234.*

Faramea glandulosa Poepp. & Endl. Nov. Gen. & Sp. 3: 29. 1845. *Itulli-caspi, Uchpa-caspi, Charachuela.*

Shrub or low, spreading tree, 15, rarely more than 30, feet in height. Branches slender, elongate. Trunk straight, cylindrical, slender, and free of limbs for about 4 feet. Bark light or dark brown, fairly smooth, with broad, low ridges, or scaly. Leaf blades

short-petiolate, narrowly oblongate, long-acuminate, acute to obtuse at base, membranaceous, glabrous. Inflorescence terminal; flowers with pale blue corolla and fragrant; May–June. Drupe globose, purple or black when mature, edible.—Abundant in both the lowland and upland, in dense forest or in old clearings (alt. 350–4,000 ft.); collected also in the lower Huallaga, in the Putumayo basin, and at La Merced. Wood is employed in the neighborhood of Tarapoto for house construction.

Wood somewhat variable in color from pale white or yellowish to pinkish brown; of medium weight to rather heavy, compact, and rather tenacious, but splintery; fairly easy to work and takes a smooth, moderately lustrous finish; liable to check in drying; often attacked by insects. Growth rings present, but not distinct. Pores minute or small; fairly numerous and well scattered. Larger rays fine, but distinguishable to unaided eye, and more uniformly spaced on cross section than in other species; indistinct or barely discernible on radial surface.

Loreto: lower Itaya, *109;* Iquitos, *1489, 3682;* La Victoria, *2525;* Yurimaguas, *4571.*—San Martín: Tarapoto, *6065, 6093.*

Faramea maynensis Spruce in Benth. & Hook. f. Gen. Pl. 2: 121. 1873.

Shrub, from 3 to 15 feet tall. Bark pale gray to dark brown, scaly or with short, low, irregular fissures. Leaf blades narrowly oblong or elliptic-oblong, glabrous, short-acuminate, acute or attenuate at base, short-petiolate, with stipules. Inflorescence terminal, in dense corymbs; corolla pale blue. Drupe transversely oval; fruiting in June–July.—Common in the lowland forest (alt. 450 ft.), usually in dry loam; collected also in the middle Marañón, in the Chanchamayo Valley (alt. 3,800 ft.), and at Tarapoto (alt. 1,400 ft.). Wood is used for fuel only.

Sapwood yellowish white or pale brown, usually with narrow pinkish streaks or extensive grayish areas; heartwood brown, perishable. Wood light and soft to medium in weight and firm; saws slightly woolly, easy to cut; not durable. Growth rings absent or poorly defined. Vessel lines often filled with lustrous deposits. Rays of same color as background, but faintly discernible to unaided eye on radial surface; heterogeneous.

Loreto: Caballo-cocha, *2107;* Yurimaguas, *7820.*

Faramea quinqueflora Poepp. & Endl. Nov. Gen. & Sp. 3: 28. *pl. 234.* 1845.

Tree, up to 15, occasionally 30, feet in height. Crown spreading. Trunk slender, often fluted, and clear of branches for 4 or 6 feet. Bark pinkish or violet brown, scaly. Leaf blades short-petiolate, membranaceous, ovate-lanceolate or rarely ovate-oblong, narrow-acuminate at apex. Inflorescence in terminal cymes; corolla bright blue. Fruit purplish or dark blue when mature.—Fairly abundant; in dry medium or heavy loam in dense forest (alt. 400–1,200 ft.). Wood is used for fuel only.

Wood variable from pale greenish or grayish white to pinkish brown and highly lustrous; of medium weight to rather heavy and compact, but inclined to be splintery and liable to check in drying; easy to work. Growth rings absent or barely visible owing to slight variation in depth of color. Parenchyma discernible with lens as very fine, short lines extending between the rays. Rays fairly broad, uniformly spaced, and distinguishable to unaided eye on cross section; pinkish brown and rather distinct on radial surface.

Loreto: near Iquitos, *3760*, *8164*.

Faramea rectinervia Standl. Field Mus. Bot. 8: 177. 1930.

Glabrous tree, about 25 feet tall. Crown spreading. Trunk straight, columnar, slender, and free of limbs up to 9 or 10 feet. Bark grayish brown, scaly or with deep, short, coarse fissures. Leaf blades subcoriaceous, oblong or elliptic-oblong, abruptly short-acuminate, acute or obtuse at base, midrib prominent beneath and of light color; petiole long, stout. Inflorescence terminal, cymose; corolla blue. Drupe light green.—Limited in its distribution; in dry loam in scant forest growth (alt. 380 ft.); collected also at Puerto Bermudez (alt. 1,050 ft.). Wood is used to a small extent for fuel.

Sapwood almost white or pale brown, not well demarcated; heartwood dull pale brown. Wood of medium weight, compact, and tough; liable to check slightly in drying; appears to be durable. Growth rings poorly defined and indicated by arrangement of elements. Rays sinuous and distinguishable without lens on cross section; visible against the lighter-colored background on radial surface.

Loreto: La Victoria, *2962*.

17. FERDINANDUSA Pohl

Ferdinandusa chlorantha (Wedd.) Standl. Trop. Woods 34: 41. 1933. *Huacamayo, Loro-micuna.*

Glabrous tree, 55 feet in height. Crown spreading. Trunk slender and unbranched for about 6 feet. Bark chocolate brown and scaly. Leaves opposite, leathery, short-stalked; stipules deciduous. Inflorescence terminal. Capsule subround or ovoid, 2-celled; seeds numerous, winged.—Uncommon; in dense flood-free forest (alt. 450 ft.).

Wood pale brown when fresh, but soon turns to deep yellowish pink, and with purplish streaks in the sapwood; odorless, but bitter; straight- or interwoven-grained; fairly fine- or medium-textured; heavy; easy to work and takes a smooth finish; checks slightly in drying; subject to sapstain. Growth rings present, but poorly defined. Parenchyma indistinct. Pores small or fairly small; numerous and well distributed; solitary or in radial multiples or rows of 2–3; open. Vessel lines of same color as adjacent elements, but barely distinguishable without lens. Rays numerous, fine or fairly fine, and slightly sinuous on cross section; visible only with lens on all surfaces; heterogeneous.

Loreto: lower Nanay, *697*.

18. GENIPA L.

Genipa americana L. Syst. Nat. ed. 10. 931. 1759; Sp. Pl. ed. 2. 251. 1762. *Huito, Jagua, Yaco-huito, Vito.*

Common tree of the lowland, from 30 to 60 feet in height. Crown conical, round, or spreading. Trunk straight, round, 13, seldom up to 24, inches in diameter, and undivided for from 10 to 20 feet. Bark light tan or reddish brown, fairly smooth or with coarse lenticels. Leaves opposite, leathery, broad, short-stalked, with stipules. Flowers large with yellowish white corolla; May–June. Fruit baccate, up to 3 inches in diameter, grayish when mature, has a leathery pericarp inclosing an astringent pulp which, although not very palatable, is esteemed by the natives for eating; seeds large, numerous, and compressed.—Abundant throughout the lowland from the Peruvian-Brazilian boundary to the foothills of the eastern Andes and occasionally in the upland up to an altitude of 3,500 ft.; most frequently around villages and abodes since it is planted as a shade tree or grows spontaneously and is protected for its fruit. The leaves and seeds yield a dark blue or black dye used for coloring cloth and by the Indians for painting their bodies as a protection against insect bites. Timber is employed for handles for axes and bush-knives, also for boxes, crates, and in general carpentry.

Wood varying in color from oatmeal to pale pinkish brown, sometimes yellowish brown or brownish gray; odorless and tasteless or slightly bitter; moderately straight- or irregular-grained; fairly fine- or medium-textured; moderately heavy to heavy; easy to work, takes a harsh, rather dull finish, and holds its place moderately well; immune to insect attacks, but subject to stain. (For description of the macroscopic structure see Timbers of Tropical America 550.) Pith dirty gray or pale brown and laminated.

Loreto: Río Masán, lower Itaya, *142;* Yarina-cocha, lower Nanay, *607;* upper Nanay, *1096;* Caballo-cocha, *2147;* La Victoria, *2932;* Santa Rosa, lower Huallaga, *4830.*—San Martín: San Roque, *7379.*

19. GONZALAGUNIA Ruiz & Pavón

Gonzalagunia cornifolia (HBK.) Standl. Field Mus. Bot. 4: 281. 1929. *Mullaca.*

Slender shrub, from 6 to 12 feet tall. Bark pinkish or medium brown, fairly smooth or fissured, thin. Leaves opposite, membranaceous, almost sessile; stipules subpersistent. Flowers small, terminal; corolla white; May–June. Fruit baccate, small, white; seeds numerous, minute.—Uncommon; forming undergrowth in dense forest clear of seasonal floods (alt. 400 ft.).

Wood uniform pale brown throughout; odorless, sometimes slightly bitter; interwoven- or fairly straight-grained; fine-textured; moderately light in weight; easy to cut and takes a smooth finish. Growth rings absent or poorly defined. Parenchyma indistinct. Pores small; fairly numerous and well scattered; mostly in radial multiples or rows of up to 5 or more, also solitary. Vessel lines fine and of same color as background. Rays fine and barely visible with lens on cross section; indistinct on other surfaces.

Loreto: lower Nanay, *579, 580, 581.*

20. HAMELIA Jacq.

Hamelia lutea Rohr. ex Smith in Rees, Cycl. 5: 17. 1811. *Yuto-banco.*

Tree, up to 35 feet in height. Crown round, pyramidal, or open. Trunk straight or fairly so, round, up to 9 inches in diameter, and unbranched for from 6 to 30 feet. Bark reddish or chocolate brown with a grayish tinge. Leaves long-stalked, membranaceous. Flowers rather small, in cymes; corolla yellow; October–November. Fruit baccate, juicy; seeds minute.—Common in some localities in the

lower Huallaga (alt. 450 ft.); usually in open, dry loam in secondary growth. Timber is used to a limited extent for general construction.

Sapwood lustrous pale yellow or yellowish brown; heartwood pinkish or reddish brown. Wood odorless and tasteless or slightly bitter; interwoven-grained; fairly fine-textured; of medium weight; easy to cut and capable of taking a smooth finish. Growth rings present, but not distinct; visible owing to some variation in depth of color. Parenchyma indistinct. Pores small; not very numerous, well distributed; solitary or in radial multiples or rows of 2–3. Vessel lines of same color as background and indistinct without lens. Rays fine or moderately fine, rather widely spaced, lighter-colored than background, and visible only with lens on cross section; indistinct on other surfaces.

Loreto: Puerto Arturo, lower Huallaga, *4974*, *5159*, *5179*.

21. HIPPOTIS Ruiz & Pavón

Hippotis brevipes Spruce ex Schum. in Mart. Fl. Bras. 6, pt. 6: 298. *pl. 133, f. 2.* 1889.

Shrub, up to 18 feet tall. Crown wide-spreading. Trunk straight, cylindrical, slender, and branching from near the base. Bark pinkish brown, scaly. Leaves short-stalked, obovate or oblanceolate, acuminate, acute or attenuate at base, glabrous or sparsely pilose above, pubescent beneath. Inflorescence axillary; flowers large, with bright red calyx and corolla; February–March. Fruit baccate, globose; seeds numerous and small.—Widely distributed, but not common; in dense forest (alt. 600–3,500 ft.). Timber is not employed locally.

Wood pale yellow with a grayish tinge and highly lustrous; odorless and tasteless; straight-grained; moderately fine-textured; of light weight and fairly soft. Growth rings barely visible at times owing to slight variation in color. Parenchyma indistinct. Pores small; fairly numerous and well scattered. Vessel lines indistinct. Rays at limit of vision on moistened cross section; not distinguishable on tangential; slightly darker than adjacent elements on radial surface.

San Martín: San Roque, *6945;* reported also from the Pongo de Cainarachi and Balsapuerto, lower Huallaga, and from Tarapoto.

22. ISERTIA Schreb.

Shrubs or small trees, with stout branches. Leaves opposite, large, leathery, and often tomentose beneath, stalked; stipules usually

4 and distinct. Flowers showy, in large, terminal panicles; calyx lobes equal or nearly so. Fruit baccate, globose; seeds numerous, small, subglobose.

Wood yellowish or pale brown, usually with grayish cast or streaked when dried; odorless, but bitter; straight- or interlocked-grained; fine- or medium-textured; of medium weight to fairly heavy; takes a smooth finish. Parenchyma indistinct. Pores minute, small, or medium-sized; numerous or fairly numerous; solitary or in small radial multiples or rows; mostly open. Rays fine on cross section; usually invisible without lens on all surfaces.

Isertia alba Sprague, Trans. Bot. Soc. Edinb. 22: 434. 1905; Macbride, Fl. Peru, pt. 6: 78–79. 1936. *Asar-quiro.*

Tree, up to 45 feet tall. Crown spreading. Trunk moderately straight, round, slender, and free of branches up to half the entire height. Bark grayish brown, fairly smooth or coarsely fissured. Leaf blades oblong to obovate-oblong, sharply acute or acuminate at apex, acute at base, deep green on the upper surface, densely whitish-tomentose beneath. Calyx reddish brown; corolla white. Fruit globose, brown when mature.—Abundant throughout the lowland (alt. 380–500 ft.); in dry loam in old clearings or along margin of forest. Wood is used for house construction and general carpentry.

Wood creamy yellow or pale brown, occasionally with a pale grayish or greenish cast; has no distinctive odor, but slightly bitter; straight- or interlocked-grained; fine- or medium-textured; of medium weight, firm, strong, but splintery, and liable to check in drying; capable of taking a smooth finish. Growth rings absent or indistinct. Parenchyma not distinguishable. Pores of small or medium size; fairly numerous or numerous and tending to crowd; solitary or in radial multiples or rows of 2–4, seldom more; mostly open. Vessel lines fine, short, of same color as adjacent elements, and barely discernible to unaided eye. Rays fine and distinguishable only with lens on cross and tangential sections; sometimes barely visible without lens on radial surface. Pith pale white or brown.

Loreto: Fortaleza, lower Huallaga, *4381;* Yurimaguas, *4418, 7856.*

Isertia rosea Spruce in Mart. Fl. Bras. 6, pt. 6: 284. 1889.

Glabrous forest tree, from 15 to 22 feet tall. Crown spreading. Trunk straight, columnar, slender, and free of branches for about half the entire height. Bark pale gray to dark reddish brown and yields, when cut, a small quantity of bitter resin. Leaves long-petiolate;

blades oblong or obovate-oblong, acuminate or obtuse-acuminate at tip, cuneate at base. Flowers with rose-colored or purplish corolla. Fruit rounded; May–June.—Of limited distribution; in humid loam, most frequently in the vicinity of streams (alt. 450 ft.). Wood is not used locally.

Wood uniform pale yellowish brown, occasionally with slightly darker brown bands; odorless, but bitter; straight- or interlocked-grained; uniformly fine-textured; of medium weight to fairly heavy, firm, strong, and rather tenacious; moderately easy to work and holds its place well; fairly durable. Growth rings poorly defined or absent. Parenchyma indistinct. Pores minute or small and barely discernible with lens. Vessel lines fine, short, and indistinct without lens. Rays discernible with lens on all surfaces. Pith yellowish or pale brown.

Loreto: upper Nanay, *1111*, *1159*.

23. IXORA L.

Shrubs or small trees, usually glabrous or mostly so. Leaves most frequently opposite and short-stalked. Inflorescence terminal or rarely axillary; calyx simple. Fruit a globose drupe, somewhat fleshy, 2-seeded or, by abortion, 1-seeded; seeds subglobose.

Wood pale yellowish white to pale brown, sometimes streaked and slightly darker brown when dried; odorless and tasteless; straight- or interlocked-grained; fine-textured; of medium density to rather heavy, tenacious, and strong; easy to work and takes a smooth finish. Parenchyma paratracheal and in concentric or broken, tangential lines or fine bands, sometimes uniting the pores. Pores minute or small; rather numerous and well scattered; solitary or in small radial rows or multiples; mostly open. Rays fine; invisible to unaided eye on all surfaces.

Ixora Finlaysoniana Wall. Cat. No. 6166. 1832. *Buquet de novia.*

Small tree, not exceeding 18 feet in height, believed to be native of Asia, and sometimes propagated in the lowland for its handsome flowers. Crown dense, spreading. Trunk round, slender, and branching 2 or 3 feet from the base. Bark pale brown, thin; inner bark purplish.

Sapwood uniform pale yellowish white; heartwood yellowish brown. Wood interlocked-grained; uniformly fine-textured, suggesting boxwood (*Casearia*); of medium weight; fairly easy to cut and takes a smooth polish.

Loreto: Caballo-cocha, *2129*.

Ixora Killipii Standl. Field Mus. Bot. 8: 174. 1930. *Chimicua.*

Medium-sized tree, often attaining a height of 40 feet. Crown spreading. Trunk straight, cylindrical, from 7 to 14 inches in diameter, free of limbs for more than one half the height, and with buttresses up to 12 inches high. Bark grayish or dark brown, fairly smooth or with low ridges. Leaf blades oblanceolate or oblong-oval, short-acuminate, acute at base, glabrous. Flowers in loose terminal panicles; corolla greenish white or cream-colored. Fruit rounded, black or dark purplish when mature; September–October.—In dense forest flanking the Paranapura River (alt. 450 ft.). Timber is used to some extent for house construction and general carpentry.

Wood pale brown with a pinkish cast and streaked with slightly darker brown; odorless and tasteless; straight- or interlocked-grained; fine- or medium-textured; moderately heavy, hard, and compact; fairly easy to work; durable. Growth rings sometimes barely visible owing to some variation in abundance of elements. Parenchyma at limit of vision on moistened surface; paratracheal and in short, irregular, tangential lines or fine bands uniting the pores, sometimes in more orderly arrangement and appearing to indicate limit of growth rings. Pores small; fairly numerous and well distributed; solitary or in radial multiples or rows of 2–3; mostly open. Vessel lines invisible or appear as fine scratches. Rays fine, evenly spaced, and discernible only with lens on cross section; indistinct on tangential and radial surfaces.

Loreto: Puerto Arturo, lower Huallaga, *5310, 5362;* collected also at La Victoria, Umbria on the Putumayo River, and along the Pichis Trail.

Ixora peruviana (Spruce) Standl. Field Mus. Bot. 7: 296. 1931.

Tall shrub, up to 14 or 18 feet tall. Crown dense, spreading. Trunk moderately straight, round, slender, and branching near the base. Bark pale brown, scaly. Leaf blades oblong or oblong-elliptic, acute or short-acuminate, long-attenuate to the base, rather long-stalked, glabrous. Flowers have a jasmine-like odor; corolla white. Fruit subglobose, red or reddish violet; December–January.—Not common; in sandy loam in secondary growth among shrubs and small trees (alt. 1,500 ft.).

Wood uniform pale yellow or pinkish brown; interlocked-grained; uniformly fine-textured; heavy, dense, tough, and strong; not easy to work; durable. Growth rings present owing to alinement of parenchyma and variation in depth of color. Parenchyma in fine, more or

less continuous, unevenly spaced, concentric bands. Pores, vessel lines, and rays not visible to unaided eye.

San Martín: Tarapoto, *6595, 6717.*

24. LADENBERGIA Klotzsch

Ladenbergia magnifolia (Ruiz & Pavón) Klotzsch, in Hayne, Arzneigew. 14: *pl. 15.* 1846. *Cascarilla amarilla, Cascarilla boba.*

Tree, approximately 30 feet tall. Crown spreading. Trunk erect, cylindrical, from 8 to 12 inches in diameter, and branching 3 or 4 feet from the base. Bark very thin, pale gray, violet, or cinnamon brown, and inner bark dark chocolate-colored; exudes when cut a small amount of pale yellow resin. Leaf blades ovate or elliptic, acute or obtuse at apex, rounded or cordate at base. Inflorescence paniculate; corolla white. Capsule pale or dark brown when mature; July–August.—Common in the vicinity of Iquitos (alt. 400 ft.); in dry loam in thickets. Timber is not used locally.

Sapwood pale yellow or light brown and highly lustrous when held to proper light; heartwood pinkish brown, thin, and perishable. Wood odorless, but bitter; straight-grained; medium-textured; of medium weight, strong, firm, but inclined to be splintery; easy to cut and takes a smooth finish. Growth rings barely visible. Parenchyma paratracheal. Pores barely at limit of vision; fairly numerous, not crowded; solitary, less frequently in small radial multiples; open. Vessel lines fine and of same color as background. Rays faintly distinguishable without lens on cross section; indistinct on tangential; at times fairly distinct on radial surface when held to proper light.

Loreto: Iquitos, *3781.*

25. MACHAONIA Humb. & Bonpl.

Machaonia Williamsii Standl. Field Mus. Bot. 8: 357. 1931.

Tree, 25 feet or more tall. Crown spreading. Trunk moderately straight and round, from 7 to 10 inches in diameter, and branching 2 or 3 feet from the base. Bark extremely thin, light gray, scaly. Leaves membranaceous, oblong-elliptic or ovate-elliptic. Fruit cuneate-obovate.—Common in the region of Juan Guerra, near the junction of the Mayo and Huallaga rivers (alt. 2,000 ft.); in dense forest. Timber is employed to some extent for construction and general carpentry, but more especially for fuel.

Wood pale yellow throughout and with slightly darker streaks; odorless, but slightly bitter; roey-grained; uniformly fine-textured;

rather heavy, strong, and compact; easy to work and takes a smooth, moderately lustrous finish; durable. Growth rings indistinct or faintly visible owing to some variation in abundance of pores. Parenchyma indistinct. Pores small; fairly numerous and well distributed; solitary or in radial multiples or rows of 2–3; mostly open. Vessel lines short, fine, and of same color as background. Rays fine and invisible without lens on all surfaces.

San Martín: Juan Guerra, *6886*.

26. MACROCNEMUM L.

Macrocnemum roseum (Ruiz & Pavón) Wedd. Ann. Sci. Nat. IV. 1: 76. 1854. *Shamoja*.

Tree, up to 80 feet in height. Crown round. Trunk often bent, fairly cylindrical, from 12 to 20 inches in diameter, and clear of limbs up to half the entire height. Bark pale gray to dark brown, fairly smooth. Leaves glabrous above, pubescent beneath especially along the veins. Flowers violet. Capsule oblong-compressed, dehiscent, about 0.5 inch long, and dark brown; seeds numerous, minute, compressed, narrowly winged; maturing October–November.—Fairly common in fairly dense forest in the lower Huallaga (alt. 500 ft.), also among small trees and shrubs on the plain of Tarapoto (alt. 1,400 ft.), on hill slopes of Campana (alt. 3,000 ft.), between Lamas and Moyobamba, and collected by other botanists at Pampayaco, Department of Huánuco, and at Posuso. Wood is used mainly for fuel and to a small extent for general construction.

Wood uniform pale grayish brown throughout; odorless and tasteless; interlocked-grained; medium-textured; of medium weight, firm, but brittle; easy to cut, takes a highly lustrous polish, and holds its place well when finished; durable. Growth rings absent or poorly defined. Parenchyma not distinguishable. Pores small; fairly numerous and evenly distributed; solitary or in radial multiples or rows of 2–4, seldom tangentially disposed; mostly open. Vessel lines fine, short, and of same color as background. Rays barely at limit of vision on moistened cross and tangential surfaces; of darker color than adjacent elements and rather prominent on radial section; heterogeneous.

Loreto: Santa Rosa, lower Huallaga, *4957*.

27. PALICOUREA Aubl.

Shrubs or small trees, similar in general appearance to the Psychotrias. Leaves large, short-stalked, acuminate. Flowers small,

in dense thyrsiform panicles; corolla enlarged at the base of the tube, and the tube is often curved, whereas in *Psychotria* the tube is straight and not enlarged at the base. Fruit a juicy drupe, 2–5-celled. Timber is used to a limited extent in some localities for general construction.

Sapwood whitish or yellowish to pale brown, often streaked with grayish markings; heartwood violet or dark brown and usually well demarcated. Wood straight-grained; fine-textured; of light or medium weight; easy to cut and takes a moderately smooth, often lustrous finish; subject to stain and insects. Parenchyma most often invisible. Pores very small or small; moderately numerous to numerous and well distributed; solitary or in small radial multiples or rows; most often open. Rays visible to unaided eye on cross section, but not always distinct; invisible on tangential; distinguishable without lens on radial surface in most species; heterogeneous; 2–3 cells wide and up to 40 cells high.

Palicourea condensata Standl. Field Mus. Bot. 8: 224. 1930; Macbride, Fl. Peru, pt. 6: 224–225. 1936.

Tree, about 45 feet in height. Crown conical. Trunk round, moderately straight, 10 inches or more in diameter, and clear of branches for upwards of 21 feet. Bark thin, pale brown, with short, low ridges. Leaves long-stalked and glabrous. Flowers in panicles; corolla deep pinkish or purple, filaments and style white, anthers and stigma deep purple. Fruit subround, violet blue when mature.—Very common; usually in dense or fairly dense forest free from periodical inundations (alt. up to 3,500 ft.); reported also from San Lorenzo on the Marañón River between the estuaries of the Pastasa and Huallaga rivers, at Balsapuerto, Río Blanco on the Ucayali, in the Putumayo region, and at Tarapoto. Wood is used to a small extent for general construction, but mostly for fuel.

Sapwood distinctly demarcated, creamy yellow or pale brown; heartwood dark brown. Wood odorless and tasteless; straight-grained; medium-textured; easy to cut, but splinters readily; not very durable. Growth rings indistinct. Parenchyma not distinguishable. Pores small; numerous and well distributed; in radial multiples or rows of 2–6, less frequently solitary; open. Vessel lines fine and of same color as background. Rays discernible to unaided eye on cross section; indistinct on tangential; of same color as adjacent elements, but distinguishable without lens, on radial surface.

Loreto: upper Itaya, *3284;* Caballo-cocha, *2078.*

Palicourea crocea (Sw.) Roem. & Schult. Syst. Veg. 5: 193. 1819.

Glabrous shrub, about 9 feet tall. Bark dark brown, fairly smooth. Branchlets deep pink or purplish red. Inflorescence in dense panicles; flowers long-stalked, with minute, orange-colored calyx lobes, and orange or red corolla. Fruit subround, pale brown when mature; April–May.—Fairly common in the lowland, in dry medium loam in clearings (alt. 350 ft.); reported also at Pampa-yaco, Huánuco, at Ccarrapa, between Huanta and Río Apurimac, Department of Ayacucho (alt. 4,800 ft.), at Pangoa, Department of Junín, along the Pichis Trail, in dense forest at Eneñas, and in the Chanchamayo Valley.

Sapwood pale yellow or pinkish brown with pinkish streaks and extensive grayish markings; heartwood chocolate brown, thin. Wood straight- or irregular-grained; medium-textured; light in weight, but firm; cuts easily and takes a fairly smooth, lustrous finish; often attacked by insects. Growth rings absent or poorly defined. Pores minute or small and barely visible with lens. Rays visible to unaided eye on moistened cross section.

Loreto: Caballo-cocha, *2287*.

Palicourea lasiantha Krause, Bot. Jahrb. 40: 341. 1908. *Jaboncillo.*

Small tree, seldom exceeding 27 feet in height. Crown composed of few branches confined to the summit. Trunk straight or bent, round, and about 8 inches in diameter. Bark pinkish, with small fissures; inner bark lustrous black. Pedicels reddish pink. Flowers with deep pink or bright wistaria-colored corolla. Fruit subround, tomentose; February–March.—In dense flood-free forest (alt. 400–3,500 ft.).

Sapwood well defined, creamy yellow with fine dark veining and with pinkish brown streaks and extensive grayish areas; heartwood dark brown, perishable. Wood straight- or irregular-grained; moderately fine-textured; of medium weight; easy to work; likely to check in drying; not durable. Growth rings present, but indistinct. Parenchyma not visible with lens. Pores minute or small; solitary or in small radial multiples or rows. Rays faintly distinguishable to unaided eye on moistened cross section; indistinct on tangential; sometimes barely discernible without lens on radial surface.

Loreto: near Iquitos, *3754*.—San Martín: San Roque, *6985;* Tarapoto, *8002*.

Palicourea nigricans Krause, Bot. Jahrb. 40: 428. 1908; Verh. Bot. Ver. Brandenb. 50: 112. 1908.

Small tree, up to 35 feet in height. Crown spreading. Trunk straight, round, slender, and clear of limbs for about 13 feet. Bark pale yellow, moderately smooth; inner bark brown. Flowers varying from rose- to violet-colored.—Fairly common in the lowland (alt. 350–550 ft.); in dense forest not subject to seasonal floods. Wood has no local application.

Sapwood constitutes the greater part of the wood, grayish white or creamy yellow and darkening slightly on exposure to sunlight; heartwood dark chocolate brown, perishable. Wood straight- or irregular-grained; medium-textured; moderately light in weight; requires a sharp knife to cut smoothly across grain; checks in drying; often attacked by insects and subject to stain. Growth rings absent or poorly defined. Parenchyma not distinguishable. Pores small; not numerous or fairly numerous and well distributed; solitary or in small radial multiples or rows. Rays visible to unaided eye on cross section in some specimens; indistinct on tangential; barely discernible without lens on radial surface.

Loreto: lower Nanay, *440*(?); lower Huallaga, *4682*, *4828*.

Palicourea paraensis (Muell. Arg.) Standl. Field Mus. Bot. 11:226. 1936; Macbride, Fl. Peru, pt. 6: 235. 1936.

Almost glabrous, tall shrub or small tree, not exceeding 16 feet in height. Crown spreading. Trunk fairly straight, columnar, slender, and unbranched for about 7 feet. Bark chocolate brown with a grayish tinge, fairly smooth or with numerous small ridges. Pedicels and corolla reddish, calyx lobes darker red; flowering in May–June. Wood is not used locally.

Sapwood pale yellow or almost white and streaked with pale gray or pink; heartwood brown, rather thin, and distinctly demarcated. Wood straight-grained; fine-textured; fairly light in weight; easy to cut and takes a smooth polish with a moderate luster. Growth rings occasionally present. Parenchyma terminal; sometimes visible without lens. Pores very small; not numerous and well scattered; solitary or in radial pairs. Rays distinguishable without lens on moistened cross section; indistinct on tangential; occasionally discernible to unaided eye on radial surface.

Loreto: Pebas, *1841;* Caballo-cocha, *2275*, *2287*, *2472*.

Palicourea punicea (R. & P.) DC. Prodr. 4: 526. 1930; Macbride, Fl. Peru, pt. 6: 236–237. 1936.

Shrub, from 6 to 9 feet tall. Bark brown. Flowers yellow. Fruit ovoid, green; March–April.—Fairly common in the vicinity of Iquitos (alt. 400 ft.); along edge of paths in fairly dense forest.

Sapwood constitutes most of the wood, yellowish brown, turning to pinkish brown on exposure; heartwood violet brown and streaked. Wood straight-grained; moderately fine-textured; light in weight. Growth rings present, but poorly defined. Parenchyma indistinct. Pores minute or very small and faintly distinguishable with lens. Rays barely at limit of vision on moistened cross section; indistinct on tangential; visible, but not prominent, to unaided eye on radial surface. Pith white.

Loreto: near Iquitos, *8003*.

28. **PENTAGONIA** Benth.

Pentagonia velutina Standl. Field Mus. Bot. 8: 347. 1931.

Small tree, up to 30 feet in height. Crown spreading. Trunk straight or moderately so, round, slender, and clear of limbs up to more than two-thirds the entire height. Bark reddish brown, scaly or with long, coarse fissures. Leaves large, glabrous above, minutely pubescent beneath especially along the veins. Flowers large, in dense cymes. Fruit baccate, round; seeds numerous, small, angulate; October.—Of limited distribution; in dense forest free from floods (alt. 600 ft.). Timber is not used locally.

Wood pale brown with a grayish cast; odorless, but slightly bitter; straight-grained; medium-textured; moderately light in weight; rather easy to cut; checks in drying; fairly durable. Growth rings absent. Parenchyma indistinct. Pores small; not numerous and uniformly scattered; solitary or in radial multiples or rows of 2–5, rarely in small clusters. Vessel lines fine, of same color as background, and indistinct. Rays distinguishable without lens on cross and tangential sections; of same color as adjacent elements and invisible or barely discernible on radial surface. Pith pale brown.

Loreto: lower Huallaga, *5046*, *5280* (type).

29. **POSOQUERIA** Aubl.

Trees or shrubs. Leaves opposite, coriaceous or subcoriaceous, stalked; stipules persistent or deciduous. Flowers large and showy, terminal; corolla tube slender, curved in bud. Fruit large, baccate, 2-celled; seeds numerous, large, irregular. Timber is not used locally except for fuel.

Sapwood pale yellow or light brown; heartwood pinkish or slightly darker brown. Wood odorless and tasteless; fine- or medium-textured; of medium density; takes a smooth polish; durable. Parenchyma in numerous, fine lines extending tangentially between the rays and in concentric bands visible without lens. Pores minute or small; not very numerous; solitary or in radial multiples or rows. Rays fine or barely visible to unaided eye on moistened cross section; invisible without lens on tangential and radial surfaces; heterogeneous; 2–4 cells wide and 25 or more cells high.

Posoqueria latifolia (Rudge) Roem. & Schultes, Syst. Veg. 5: 227. 1819. *Ucullucui.*

Glabrous tree, from 10 to 35 feet in height. Crown spreading. Trunk straight, cylindrical, slender, and free of branches for from 2 to 9 feet. Bark light or purplish brown, with small fissures or rather coarse, low ridges; inner bark in old trees separates into coarse flakes. Inflorescence in dense terminal corymbs; flowers white, with salverform corolla. Fruit baccate, round, resembling a small orange, yellow and edible when mature; seeds numerous, black.—Fairly common in both the lowland and upland forests (alt. 380–1,500 ft.); in dry or alluvial loam. Timber is used for fuel only.

Sapwood well demarcated, variable in color from pale yellow to light brown with a grayish pink tinge; heartwood brown. Wood odorless and tasteless; straight- or irregular-grained; fine- or medium-textured; of medium weight to rather heavy; capable of taking a smooth, dull polish, strong and durable, but subject to stain. Growth rings present owing to variation in abundance of elements. Parenchyma in numerous fine lines extending between the rays, also in wavy, broken or continuous, concentric bands visible without lens. Pores minute or small; not very numerous and uniformly scattered; solitary or in small radial multiples or rows; open or closed. Vessel lines fine, of same color as background, and indistinct. Rays numerous, very fine, and visible only with lens or barely distinguishable to unaided eye on moistened cross section; indistinct on tangential; faintly discernible with lens on radial surface. Pith white, narrow.

Loreto: upper Nanay, *852, 998;* La Victoria, *2874.*—San Martín: Lamas, *6532;* Tarapoto, *6540, 6545, 6701.*

Posoqueria longiflora Aubl. Pl. Guian. 1: 134. *pl. 51.* 1775. *Remo-caspi.*

Shrub, about 15 feet tall, with many branches. Trunk slender and free of limbs for 5 feet. Bark reddish or purplish brown, moderately smooth. Flowers white, with slender, much elongated, salverform corolla. Fruit yellowish brown; January–February.—Fairly common in both the lowland and upland (alt. 450–1,400 ft.); in dense forest, frequently near streams. Timber is not used locally.

Sapwood fairly well demarcated, uniform pale yellow or light brown; heartwood dull pinkish brown, thin. Wood odorless and tasteless; straight- or interwoven-grained; uniformly fine-textured; of medium weight; capable of taking a smooth polish; strong and durable. Growth rings absent or poorly defined. Parenchyma in numerous, very fine lines extending between the rays, also in concentric bands barely at limit of vision on moistened section. Pores minute and barely distinguishable with lens. Rays sometimes faintly visible with lens on moistened cross section; indistinct on tangential; of same color as background and faintly distinguishable to aided eye on radial surface.

San Martín: Tarapoto, *6101*.

30. PSYCHOTRIA L.

The largest genus of the family Rubiaceae, generously represented in tropical America by shrubs or small trees. Leaves opposite, either green and persistent or brownish and deciduous. Inflorescence terminal, in a few species axillary; flowers small and inconspicuous, white, yellowish, or greenish. Fruit baccate, small, fleshy, and containing two or five 1-seeded nutlets which are often ribbed. The members of this genus are without economic importance.

Wood yellowish or pale pinkish brown, often without sharp demarcation between sap and heart; odorless and tasteless; fine-, seldom medium-textured; ranging in density from light to rather heavy, hard, and tenacious; easy to work and capable of taking a smooth polish. Parenchyma invisible or distinguishable with lens as numerous, fine, wavy, concentric lines forming a network pattern with the rays, infrequently appears to indicate limit of growth rings. Pores minute or small, infrequently of medium size; fairly numerous and well scattered; solitary or in small radial multiples or rows; open. Rays fine, wavy, not numerous to numerous on cross section; indistinct on tangential; infrequently distinguishable to unaided eye on radial surface.

Rays heterogeneous; 1–2–3 cells wide and 20 cells or more high. Wood fibers fairly thick-walled and often septate.

Psychotria alba Ruiz & Pavón, Fl. 2: 58. *pl. 205.* 1799. *Ucumimicuna.*

Almost glabrous tree, seldom more than 25 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched up to two-thirds the entire height. Bark pale gray or dark brown, with few, coarse ridges. Inflorescence terminal, many-flowered; corolla pale yellow or white. Fruit subround, dark red.—Widely distributed, especially in the upland (alt. 400–3,500 ft.); in open dry loam, occasionally in fairly dense forest. Wood is used to a limited extent for house construction.

Sapwood pale pinkish brown, usually streaked; heartwood dull brown, thin. Wood odorless and tasteless; straight- or roey-grained; fine-textured; fairly light in weight; easy to cut and takes a smooth finish; checks in drying. Growth rings present, but not distinct. Parenchyma in numerous, very fine, short lines extending between the rays. Pores minute or small; not numerous and well scattered; in radial rows or multiples of 2–4, less frequently solitary; open. Vessel lines fine and barely discernible; often filled with pale white deposit of calcium. Rays numerous, slightly wavy, moderately fine, and visible only with lens on cross section; visible to aided eye on tangential owing to small, dark brown globules of gum present in the cells; faintly discernible without lens on moistened radial surface. Pith grayish white; light or dark brown specks of gum common.

San Martín: San Roque, *6959, 7071, 7219;* herbarium material collected also at Tarapoto and in lower Itaya.

Psychotria alboviridula Krause, Notizbl. Bot. Gart. Berlin 6: 208. 1914.

Slender shrub, about 15 feet tall, with few branches. Bark dark brown, with coarse ridges. Leaves glabrous and subcoriaceous. Inflorescence terminal; flowers tan-colored, small, numerous, and nearly sessile. Fruit round, smooth, orange red, turning to dark red or purplish at maturity; July–August.

Sapwood deep pink; heartwood dark brown, thin. Wood odorless and tasteless; interwoven-grained; uniformly fine-textured; of medium weight; capable of taking a smooth polish. Growth rings present, but indistinct. Parenchyma very fine and indistinct with lens. Pores minute; solitary or in small radial multiples or rows. Vessel lines not visible without lens. Rays occasionally at limit of vision on moistened cross section; indistinct on other surfaces.

Loreto: La Victoria, *2534, 2803;* near Iquitos, *8178;* herbarium material collected also in the lower Huallaga.

Psychotria capitata R. & P. Fl. 2: 59. *pl. 206, f. a.* 1799; Field Mus. Bot. 13, pt. 6: 186. 1936. *Cuchara-caspi, Mullaca del ajo.*

Shrub, up to 16 feet tall. Bark pale brown or dark, smooth or scaly. Fruit round, bluish black when mature, borne in clusters; December–January.—Widely distributed, but nowhere common; in open dry loam among shrubs (alt. 400–1,400 ft.). Timber is sometimes used for the construction of huts.

Sapwood pale yellow, occasionally with grayish areas; heartwood dark brown, perishable. Wood straight- or interwoven-grained; uniformly fine-textured; of medium weight, tough, and strong; takes a smooth finish. Growth rings absent or faintly indicated by terminal parenchyma. Pores minute. Rays numerous, wavy, fine, and sometimes barely at limit of vision on moistened cross section; indistinct on tangential; of same color as background and indistinct or slightly discernible without lens on radial surface.

Loreto: La Victoria, *2960;* upper Itaya, *3429.*—San Martín: Tarapoto, *6091, 6593.*

Psychotria cupularis (Muell. Arg.) Standl. Field Mus. Bot. 8: 210. 1930.

Tree, up to 45 feet in height. Crown spreading. Trunk moderately straight, round, about 12 inches in diameter, and unbranched up to 30 feet. Bark reddish brown, with small, shallow fissures. Fruit round, red when mature; July.—Not common; in dense, tall forest growth (alt. 350 ft.). Wood is not used locally.

Wood dark pinkish brown with a grayish tinge; interwoven-grained; moderately fine-textured; of fairly light weight, but strong; easy to cut and takes a smooth, dull finish; moderately durable. Growth rings absent or poorly defined. Parenchyma invisible or barely discernible with lens. Pores small; not numerous, well distributed; solitary or in radial multiples or rows of 2–3; open. Vessel lines very fine, but faintly discernible without lens; lustrous deposit common. Rays at limit of vision on moistened cross section; indistinct on tangential; visible, but inconspicuous, along outer edge of sapwood on radial surface.

Loreto: Pebas, *1749.*

Psychotria Ernesti Krause, Verh. Bot. Ver. Brandenb. 50: 109. 1908.

Tree, up to 30 feet high. Crown spreading. Trunk straight, round, about 7 inches in diameter, and free of limbs for half the entire height. Bark pale green to dark brown, fairly smooth. Corolla white; flowering in October.—Uncommon; in dry loam in clearings or along margin of forest (alt. 450 ft.). Wood is seldom used locally.

Wood pale brown with pinkish cast; odorless and tasteless; straight- or wavy-grained; medium-textured; of medium weight, firm, and strong; easy to cut and takes a smooth polish. Growth rings present owing to variation in depth of color. Parenchyma indistinct. Pores of medium size; fairly numerous, well scattered; solitary or in radial multiples or rows of 2–3; open. Vessel lines appear as fine, short scratches; grayish white deposits frequent. Rays numerous, slightly wavy, and barely at limit of vision on moistened cross section, indistinct on tangential; faintly discernible without lens on moistened radial surface.

Loreto: near Yurimaguas, *4445*.

Psychotria falcata Rusby, Mem. Torrey Club 3, no. 3: 47. 1893.

Tall shrub, up to 14 feet in height. Bark pale brown, with numerous, short, shallow fissures. Fruit dark blue.—Not common; in sandy loam among small trees and shrubs of secondary growth (alt. 1,400 ft.); reported also above San Ramón, Chanchamayo Valley (alt. 4,500 ft.).

Wood pale yellow; interwoven-grained; uniformly fine-textured; light in weight, but compact. Growth rings present or poorly defined. Parenchyma not visible with lens. Pores minute and barely discernible to aided eye. Rays wavy, fine, lighter-colored than fibers, and at limit of vision on cross section; indistinct on other surfaces.

San Martín: Tarapoto, *5962*.

Psychotria involucrata Sw. Prodr. Veg. Ind. Occ. 45. 1788.

Common, slender shrub, about 7 feet tall. Bark lustrous brownish black and smooth.—Common throughout the lowland in flood-free forest, also in moderately dense growth in the upland (alt. 400–2,700 ft.).

Sapwood pale yellow; heartwood dull grayish brown. Wood interwoven-grained; uniformly fine-textured. Growth rings present, but poorly defined. Parenchyma indistinct. Pores minute and barely visible with lens; sometimes filled with brownish gum. Rays fine, numerous, and wavy on cross section; indistinct on tangential; of same color as background and faintly distinguishable with lens on radial surface.

Loreto: near Iquitos, *8006;* herbarium material collected also in the lower and upper Nanay, at La Victoria, and in the lower Huallaga, Department of Loreto, and at Lamas and Moyobamba, Department of San Martín.

Psychotria japurensis Muell. Arg. in Mart. Fl. Bras. 6, pt. 5: 328. 1881.

Shrub, about 10 feet tall. Bark light or dark chocolate brown, fairly smooth. Flowers reddish brown. Fruit small, dark brown. —Not common; forming undergrowth in dense forest (alt. 400 ft.).

Wood light brown; interwoven-grained; uniformly fine-textured; Growth rings absent. Parenchyma indistinct. Pores minute and faintly visible with lens. Rays fine, numerous, and wavy on cross section; indistinct on tangential; faintly discernible with lens on radial surface.

Loreto: Pebas, *1681.*

Psychotria macrophylla Ruiz & Pavón, Fl. 2: 56. *pl. 202.* 1799.

Shrub about 2 feet tall. Leaves large, herbaceous. Flowers white. Fruit white or reddish.—In dry open loam in forest (alt. 450 ft.).

Loreto: lower Huallaga, *4669.*

Psychotria Mathewsii Standl. Field Mus. Bot. 4: 342. 1929. *Topamaki.*

Glabrous shrub, up to 15 feet in height, with many branches and slender trunk. Bark deep purplish or brown, with small excrescences or rather coarse, long ridges. Leaves dark green on the upper surface and sometimes purplish beneath. Corolla greenish white. Fruit round, dark red when mature.—Widely distributed throughout the lowland and upland (alt. 400–1,800 ft.); often in old clearings or in the vicinity of abodes; reported also in dense forest in the Paucartambo Valley (alt. 2,200 ft.), and near Kimpitiriki, Apurímac Valley, Department of Ayacucho.

Wood cream-colored or pinkish brown throughout; interwoven-grained; uniformly fine-textured; of light or medium weight, compact, and durable; takes a smooth, rather lustrous polish. Growth rings absent or faintly visible. Parenchyma indistinct. Pores minute. Rays moderately fine and sometimes barely at limit of vision on cross section; not discernible to unaided eye on other surfaces.

Loreto: near Iquitos, *378;* Caballo-cocha, *2473.*—San Martín: Tarapoto, *6057;* Lamas, *6409.*

Psychotria nigricans Standl. Field Mus. Bot. 8: 205. 1930.

Tall shrub or small tree, up to 14 feet or more tall. Crown pyramidal. Bark light or dark brown with a pinkish cast, fairly smooth. Flowers pink-colored. Fruit compressed-round; July.—Common in the vicinity of Pebas in dry open patches (alt. 350 ft.).

Wood uniform pale brown; interwoven-grained; uniformly fine-textured. Growth rings present or indistinct. Parenchyma indistinct. Pores minute or small. Rays visible with lens on cross and radial surfaces; indistinct on tangential. Pith yellowish white, lustrous.

Loreto: Pebas, *1603, 1777.*

Psychotria racemosa (Aubl.) Willd. Sp. Pl. 1: 966. 1797.

Small, slender shrub. Bark pinkish or reddish brown, moderately smooth. Fruit orange or reddish pink, black at maturity.—Common throughout the lowland; along margin of forest (alt. 350–400 ft.).

Wood uniform pale brown with pinkish cast; straight- or interwoven-grained; uniformly fine-textured; rather heavy, compact, and tough. Growth rings absent or poorly defined. Parenchyma in numerous, very fine, concentric lines or bands. Pores small and visible only with lens; not numerous, scattered; solitary or in small multiples. Vessel lines of same color as background and indistinct. Rays barely visible with lens on cross section; indistinct on other surfaces.

Loreto: lower Itaya, *8169;* herbarium material collected also at Pebas, Caballo-cocha, La Victoria, and in the lower Huallaga.

Psychotria viridis Ruiz & Pavón, Fl. 2: 61. *pl. 210, f. b.* 1799. *Paujil-chaqui.*

Glabrous shrub or small tree, up to 18 feet in height. Crown spreading or flat. Trunk straight, slender, and unbranched for half the entire height. Bark greenish, dark brown, or almost black, often with few, coarse ridges. Flowers small, sessile, white or greenish white. Fruit a red or reddish brown drupe; December–January. —Common; in dense or moderately dense forest in the lowland and especially in the vicinity of Tarapoto (alt. 400–1,500 ft.).

Wood pinkish or pale brown; straight- or wavy-grained; uniformly fine-textured; of medium weight, compact, and tenacious;

takes a smooth polish; durable. Growth rings present or indistinct. Parenchyma indistinct. Pores minute and sometimes barely visible with lens. Rays very fine, but occasionally at limit of vision on moistened cross section; sometimes distinguishable with lens on tangential and radial surfaces.

Loreto: upper Itaya, *3363;* near Yurimaguas, *4836.*—San Martín: Tarapoto, *6030, 6699;* Río Mayo, *6278.*

31. RANDIA L.

Trees or shrubs, often armed with stout spines. Leaves opposite, sessile or stalked; stipules small. Flowers small or large, perfect or dioecious, solitary or fasciculate, axillary or terminal. Fruit baccate, 2-celled; seeds few or numerous, compressed, and imbedded in pulp. Timber is not of economic importance.

Wood yellowish, pinkish, or pale brown; odorless and tasteless; fine-textured; of light or medium weight to fairly heavy; easy to work and capable of taking a smooth polish. Parenchyma invisible or in fine concentric bands. Pores minute or small; fairly numerous and uniformly distributed; solitary or in small radial or diagonal multiples. Rays numerous, very fine, closely spaced; visible only with lens on cross and radial sections; indistinct on tangential.

Rays heterogeneous; uniseriate or biseriate in the middle part. Wood fibers very thick-walled.

Randia armata (Sw.) DC. Prodr. 4: 387. 1830; Field Mus. Bot. 13, pt. 6: 102. 1936. *R. spinosa* Karst. Fl. Colomb. 2: 128. 1869. *Espina, Espuela-casha.*

Small tree, not more than 20 feet in height. Crown flat or spreading. Trunk moderately straight, round, slender, and unbranched for about 3 feet. Twigs armed with strong spines in pairs. Bark pinkish or reddish brown, scaly or fairly smooth. Flowers pale yellow or white. Fruit round, light brown with a greenish tinge when mature.—Very common in the lower Huallaga and around Tarapoto (alt. 500–1,500 ft.); reported also along the Perene River, Department of Junín (alt. 1,900 ft.).

Sapwood uniform pale yellow or light brown; heartwood dull brown, thin, and well defined. Wood odorless and tasteless; interwoven-grained; uniformly fine-textured; of medium weight or moderately heavy, tenacious, and strong; not difficult to work and capable of taking a smooth polish; susceptible to damage by insects. Growth rings poorly defined. Parenchyma in fine concen-

tric bands. Pores minute and indistinct with lens. Vessel lines very fine and not discernible with lens. Rays very numerous; barely distinguishable on cross and radial sections; indistinct on tangential surface.

Loreto: lower Huallaga, *4117, 5165, 5244.*—San Martín: Tarapoto, *5674, 6700.*

Randia Ruiziana DC. Prodr. 4: 388. 1830; Field Mus. Bot. 13, pt. 6: 105. 1936. *R. formosa* var. *longiflora* (R. & P.) K. Schum. in Mart. Fl. Bras. 6, pt. 6: 343. *pl. 131.* 1889.

Shrub, about 14 feet tall. Bark pale brown, with long, low ridges. Flowers white, fragrant, with long salverform corolla. Fruit baccate, with thin, dark brown pericarp and lustrous reddish brown seeds. —Widely distributed, but nowhere abundant; in old clearings (alt. 400–1,400 ft.).

Sapwood distinctly defined, pale pinkish brown; heartwood dull brown. Wood interwoven-grained; uniformly fine-textured. Growth rings present, but indistinctly defined. Parenchyma indistinct. Pores not visible with lens. Rays numerous, fine, and sometimes faintly discernible without lens on cross section; invisible on other surfaces.

Loreto: Pebas, *1921;* collected also at Tarapoto.

Randia Tessmannii Standl. Field Mus. Bot. 4: 327. 1929.

Straggly shrub. Bark very thin, reddish brown, smooth, and coarsely fibrous. Flowers white; October–November.—Of limited occurrence; in humid loam or along banks of streams (alt. 450 ft.).

Wood pale brown with a pinkish hue and lighter brown or grayish streaks; odorless and tasteless or slightly astringent; straight- or roey-grained; moderately fine-textured; light in weight, but firm. Parenchyma in unevenly spaced, concentric bands. Pores small; mostly solitary, also in small radial or diagonal multiples. Vessel lines indistinct. Rays numerous, very fine, closely spaced, and visible only with lens on cross section; invisible or discernible with lens on radial surface.

Loreto: Yurimaguas, lower Huallaga, *4929.*

Randia Williamsii Standl. Field Mus. Bot. 8: 169. 1930.

Unarmed, often straggly, shrub, up to 14 feet in height. Crown pyramidal or spreading. Bark tan-colored and fairly smooth. Flowers white, terminal, and solitary. Fruit pale brown and con-

taining many seeds.—Not common; in open, dry loam along margin of forest (alt. 380 ft.).

Sapwood almost white or pale brown; heartwood slightly darker brown. Wood interwoven-grained; uniformly fine-textured; of medium weight. Growth rings present. Parenchyma in widely and irregularly spaced, concentric bands faintly visible to unaided eye. Pores minute, but distinguishable with lens; moderately numerous and uniformly distributed. Vessel lines indistinct. Rays numerous, very fine, closely spaced, and visible with lens on cross section; indistinct on tangential; of same color as background, but distinguishable with lens, on radial surface.

Loreto: La Victoria, *2531*, *2538* (type).

32. REMIJIA DC.

Remijia peruviana Standl. Field Mus. Bot. 8: 156. 1930. *Asar-sisa, Cascarilla, Collar-sisa.*

Small tree, about 30, infrequently up to 50, feet in height. Crown spreading. Trunk straight, cylindrical, slender, and free of branches up to more than half the entire height. Bark pinkish or reddish brown, fairly smooth or with small scales. Leaves opposite, coriaceous. Flowers fragrant; corolla white. Fruit capsular, elongate-oblong, reddish brown with a grayish cast when mature.—Common in the vicinity of Iquitos and Tarapoto; in flood-free forest (alt. 450–1,500 ft.).

Sapwood uniform creamy yellow or pale pinkish brown; heartwood pinkish or light brown. Wood odorless, but bitter; interwoven-grained; moderately fine-textured; of medium weight, strong, and rather tenacious; capable of taking a smooth polish and holds its place well when finished; fairly durable, but susceptible to insect attacks. Growth rings present. Parenchyma in numerous, very fine, short lines extending between the rays. Pores small; fairly numerous and well distributed; mostly solitary, infrequently in small multiples. Vessel lines fine and indistinct. Rays barely at limit of vision on moistened cross section; indistinct on tangential; faintly visible with lens on radial surface.

Loreto: upper Nanay, *675;* near Iquitos, *1511*, *1512*, *3738*, *8022;* upper Itaya, *3190.*—San Martín: Tarapoto, *6107*, *6322*, *6670.*

33. RUDGEA Salisb.

Large shrubs or small trees, with stout twigs. Leaves opposite, rather leathery, and short-stalked. Inflorescence terminal, some-

times reduced to a single flower, the latter sessile. Fruit baccate, containing two 1-seeded nutlets; seeds with a narrow fissure and a central cavity. Wood is not used locally.

Wood whitish or pale to medium brown, often with a grayish tinge, and fairly lustrous when held to proper light; sometimes slightly fragrant and astringent when freshly cut; fine-textured; easy to cut and takes a smooth polish. Parenchyma barely visible with lens as fine lines in concentric arrangement or extending tangentially between the rays. Pores minute or small; fairly numerous and well distributed; solitary or in small radial multiples or rows; open. Rays fine and lighter-colored than background on cross section; invisible to unaided eye on tangential; sometimes slightly darker than background and barely distinguishable without lens on radial surface.

Rays heterogeneous; 1–3 cells wide and up to 20 or more cells high.

Rudgea amazonica Muell. Arg. Flora 59: 449, 460. 1876.

Shrub, 10 feet or more tall. Trunk bent, subround or compressed. Bark medium chocolate brown, with low fissures.—Of limited distribution; in dry medium loam in old clearings or among shrubs and small trees along margin of forest (alt. 350 ft.).

Sapwood constitutes most of the wood, pale brown with a grayish hue and fairly lustrous when held to proper light; heartwood dull medium brown. Wood slightly fragrant, but tasteless; straight- or interwoven-grained; fine-textured; of light weight, but firm; easy to cut, takes a smooth finish, and holds its place fairly well. Parenchyma in numerous, fine lines extending tangentially between the rays and barely visible with lens on cross section. Pores small; fairly numerous, well scattered; solitary, less frequently in small radial multiples. Rays fine and visible only with lens on cross section; of same color as background and invisible or slightly darker and at limit of vision on radial surface.

Loreto: La Victoria, *2813*.

Rudgea canephorantha (Wernh.) Standl. Field Mus. Bot. 13, pt. 6: 161. 1936.

Shrub, about 15 feet tall. Twigs pale brown or yellow. Bark pinkish brown, scaly. Leaves glabrous, light green beneath. Fruit subround, pale brown; December–January.—Very common on the plain of Tarapoto in secondary growth (alt. 1,400–1,800 ft.).

Wood pinkish brown; straight- or interwoven-grained; uniformly fine-textured; moderately heavy, hard, and tenacious; takes a smooth

polish; durable. Growth rings present. Parenchyma indistinct. Pores small; fairly numerous, scattered; mostly solitary; sometimes filled with white deposit. Vessel lines fine and of same color as background. Rays fine, not very numerous, slightly lighter-colored than fibers on cross section; indistinct or barely visible with lens on tangential; faintly discernible without lens on radial surface.

San Martín: Tarapoto, *6110*.

Rudgea ciliata (Ruiz & Pavón) Spreng. Syst. Veg. 1: 755. 1825.

Shrub, 10 feet tall, with round crown. Trunk branching 1 or 2 feet from the base. Bark pale brown, with fairly numerous, moderately coarse ridges. Fruit round, brown when mature; December–January.—In dry loam among shrubs and small trees, often along edge of paths, or in moderately dense forest (alt. 3,500 ft.).

Wood creamy white when fresh, becoming pale brown after long exposure; has a slightly fragrant odor, but no distinctive taste; interwoven-grained; fine-textured; fairly light in weight, but firm and strong; easy to cut and takes a smooth finish; perishable. Growth rings present owing to some variation in depth of color. Parenchyma barely visible with lens. Pores small; solitary or in small radial multiples. Rays fine, lighter-colored than background, and visible only with lens on cross section; invisible or distinguishable to aided eye on radial surface.

San Martín: San Roque, *7072*.

Rudgea loretensis Standl. Field Mus. Bot. 8: 230. 1930.

Shrub, from 9 to 15 feet in height. Trunk fairly straight, round, and unbranched up to 6 feet. Bark pale or dark brown, with shallow, but fairly coarse ridges; wood beneath bark often with a grayish white cast. Flowers white; July–August.—Common in the lower Peruvian Amazon (alt. 350–400 ft.); in dry or slightly humid loam in fairly dense forest.

Wood whitish or pale brown when fresh, usually with a grayish tinge when dried; slightly fragrant, tasteless or slightly bitter; straight-grained or fairly so; fairly fine-textured; light or moderately light in weight; easy to cut; not durable. Growth rings absent or poorly defined; sometimes appear to be indicated by bands of terminal parenchyma. Parenchyma barely distinguishable with lens as very numerous, fine, tangential lines reaching between the rays. Pores small; fairly numerous or numerous and well scattered; solitary or in small radial multiples or rows; open. Vessel lines indistinct.

Rays numerous, fine, closely spaced, and slightly wavy on cross section; indistinct on tangential; not visible or barely discernible to aided eye on radial surface.

Loreto: Caballo-cocha, *2233;* La Victoria, *2618, 2841, 2877.*

Rudgea Poeppigii K. Schum. ex Standl. Field Mus. Bot. 13, pt. 6: 167. 1936.

Small shrub. Bark tan-colored or pale brown, fairly smooth or with small scales. Fruit round, pale yellow; October–November.—Forming undergrowth in dense forest clear of seasonal floods (alt. 450 ft.).

Wood pale brown and darkening somewhat on exposure; odorless and tasteless; straight- or slightly wavy-grained; medium-textured; of fairly light or medium weight, but firm and strong; easy to cut. Parenchyma in fine, numerous, closely spaced, wavy, tangential lines extending between the rays, sometimes in terminal bands. Rays slightly sinuous, lighter-colored than surrounding elements, and prominent on cross section; darker than background and at limit of vision on other surfaces.

Loreto: Yurimaguas, lower Huallaga, *4162.*

Rudgea retifolia Standl. Field Mus. Bot. 8: 227. 1930; Field Mus. Bot. 13, pt. 6: 168. 1936. *Amanga, Pichico, Sanango de bajo.*

Shrub or small tree, 12 to 18 feet high, with spreading branches. Trunk bent, round, and free of branches for 5 feet. Bark dark chocolate-colored, with numerous, moderately small lenticels, occasionally with short, low, fairly sharp ridges. Flowers white; July–August.—In dry loam in old clearings, sometimes forming undergrowth in fairly dense, flood-free forest (alt. 350 ft.).

Wood almost white with pale grayish streaks and no sharp distinction between sap and heart; odorless and tasteless or slightly astringent; straight- or interwoven-grained; uniformly fine-textured; light in weight. Parenchyma barely visible with lens. Pores minute or very small. Rays light-colored, wavy, unevenly spaced; visible only with lens on cross and radial surfaces.

Loreto: lower Nanay, *756;* Caballo-cocha, *2228.*

34. SICKINGIA Willd.

Trees or shrubs. Leaves opposite; stipules sometimes large. Flowers small or medium-sized, paniculate. Capsule usually round, 2-celled, bivalvate; seeds large and broadly winged. Timber is used locally for miscellaneous purposes.

The woods of this genus are white, yellowish, or pale brown when freshly cut, but turn pinkish when exposed to air; this handsome coloration, unfortunately, fades after prolonged exposure to sunlight. Wood odorless and tasteless; fine-textured; takes a smooth polish; durable. Parenchyma usually indistinct or invisible with lens. Pores minute or small; fairly numerous and well scattered; in small radial multiples or rows, less frequently solitary, seldom in small clusters; mostly open. Rays numerous or fairly numerous, light-colored, usually visible only with lens on cross section; indistinct on tangential; seldom discernible without lens on radial surface.

Sickingia tinctoria (HBK.) Schum. Bot. Jahrb. 10: 328. 1888; Mart. Fl. Bras. 6, pt. 6: 228. 1889; Field Mus. Bot. 13, pt. 6: 63. 1936. *Huacamayo-caspi, Machu-sacha, Puca-quiro.*

Small or medium-sized tree, up to 55 feet in height, but said to attain greater stature. Crown spreading. Trunk straight, cylindrical or fairly so, about 10 inches in diameter, and unbranched for almost two-thirds the entire height. Bark up to 0.25 inch thick, dark grayish brown, and rather rough. Leaves subleathery. Capsule round, dark brown when mature; October–December.—Fairly common in both the lowland and upland, especially around the estuary of the Mayo River (alt. 400–1,800 ft.); in moderately dense forest free from periodical floods. Timber is used in the upland for making spoons and utensils and for general construction.

Sapwood yellow when freshly cut, becomes yellowish brown or deep pink on exposure to air; heartwood deep pink, not sharply defined. Wood odorless, but slightly bitter; interwoven-grained; fine-textured; rather heavy, fairly hard, and compact; not difficult to work and takes a smooth polish; checks in drying; moderately durable. Growth rings present or poorly defined. Parenchyma indistinct. Pores small; fairly numerous and well scattered; in small radial multiples or rows or solitary; mostly open. Vessel lines very fine and indistinct. Rays numerous, wavy, lighter-colored than background, and discernible without lens on cross section; indistinct on tangential; occasionally visible without lens, but not prominent, on radial surface.

Loreto: lower Itaya, *110;* upper Nanay, *909;* lower Huallaga, *4132.*—San Martín: Tarapoto, *6227, 6659, 6660*(?).

Sickingia Williamsii Standl. Field Mus. Bot. 8: 340. 1931. *Puca-quiro.*

Small tree, about 35 feet in height. Crown round. Trunk erect, round, about 14 inches in diameter, and unbranched for 15 feet. Bark pinkish or pale brown, scaly. Leaves entire, glabrous, and subcoriaceous. Capsule grayish when unripe, turning to light brown at maturity; January–February.—Uncommon; in open sandy loam (alt. 1,500 ft.). Timber is used for beams in the construction of houses.

Wood pale brown when freshly cut, but soon turns to deep pink after exposure to air and becomes pale brown with pinkish areas when dried; odorless and tasteless; moderately straight- or interwoven-grained; moderately fine-textured; rather heavy, tough, and compact; not difficult to work, takes a smooth polish, and holds its place fairly well when finished; fairly durable. Growth rings present, but not well defined. Parenchyma indistinct. Pores small; rather numerous and well scattered; in small radial multiples or rows, less frequently solitary or in diagonal pairs. Vessel lines fine and indistinct. Rays moderately fine, evenly spaced; discernible only with lens on cross and radial sections; indistinct on tangential.

San Martín: Tarapoto, *5531* (type).

35. SOMMERA Schlecht

Sommera sabiceoides K. Schum. in Mart. Fl. Bras. 6, pt. 6: 300. *pl. 133, f. 1.* 1889. *Varilla.*

Small tree or tall shrub, seldom exceeding 20 feet in height. Crown spreading. Trunk straight, round, slender, and unbranched for 4 or 5 feet. Bark pale brown, scaly or coarsely fissured; inner bark pinkish or purplish brown. Twigs slender, smooth, light or dark brown, with long internodes. Leaves petiolate, thin. Flowers axillary; sepals grass green; petals white. Fruit baccate, ovoid, pubescent, pale brown, 2-celled; seeds numerous, minute.—Very common throughout the lowland from the Peruvian-Brazilian frontier to the eastern Andean foothills (alt. 350–1,500 ft.); most frequently forming undergrowth in dense forest.

Sapwood well demarcated, pinkish brown or pale yellow, in some specimens with extensive dark grayish areas caused by stain; heartwood reddish brown. Wood odorless, but slightly sweet; straight- or interwoven-grained; fine-textured; light or moderately light in weight; not difficult to cut and takes a smooth finish. Growth rings present or poorly defined. Parenchyma in widely spaced, concentric bands and terminal. Pores minute or small; few or fairly numerous, well scattered; solitary or in small radial multiples or rows. Vessel

lines of same color as background and indistinct. Rays fine, numerous, evenly spaced; visible with lens on cross and tangential sections; sometimes discernible without lens on radial section.

Loreto: Pebas, *1810;* Caballo-cocha, *2076;* La Victoria, *2664, 2862, 2935;* herbarium material collected also in the lower Itaya, Nanay, and Huallaga.

36. SPHINCTANTHUS Benth.

Sphinctanthus maculatus Spruce ex Schum. in Mart. Fl. Bras. 6, pt. 6: 356. 1889.

Unarmed shrub or small tree, from 10 to 15 feet tall. Crown spreading. Trunk straight, slender, and branching a few feet from the base. Bark pale brown or greenish, fairly smooth. Leaves opposite, short-stalked. Flowers in terminal cymes; corolla elongated and salverform. Fruit baccate, round, 2-celled, orange-colored when mature; seeds numerous, compressed; September–October.—Not common; in open dry medium loam in the lower Huallaga (alt. 500 ft.); reported also from Balsapuerto, Cahuapanas on the Pichis River, and near the estuary of the Santiago River, an affluent of the Marañón.

Sapwood almost white or uniform pale creamy yellow; heartwood pale grayish, indistinctly defined. Wood odorless and tasteless; interlocked-grained; uniformly fine-textured; of light weight; takes a smooth polish. Growth rings present. Parenchyma indistinct. Pores minute. Vessel lines not visible with lens. Rays lighter-colored than fibers, fairly numerous, slightly undulating, and barely at limit of vision on moistened cross section; indistinct on tangential; barely distinguishable with lens on radial surface.

Loreto: near Yurimaguas, *4730.*

37. TOCOYENA Aubl.

Unarmed, small trees or shrubs. Leaves opposite, leathery, stalked. Flowers large and showy, terminal, cymose. Fruit baccate, globose or oblong, 2-celled, with a leathery pericarp; seeds numerous, compressed, horizontal, and imbedded in a pulp.

Wood pale pinkish or yellowish brown, darkening slightly on exposure; odorless and tasteless or slightly bitter; fine-textured; of medium weight to moderately heavy and strong; easy to work and takes a smooth polish. Parenchyma invisible or barely discernible with lens as numerous, very fine lines extending between the rays,

and at times appear to indicate limit of growth rings. Pores minute to fairly small; moderately numerous and uniformly distributed; solitary or in small radial multiples or rows; open. Rays numerous, fine on cross section; usually indistinct or invisible to unaided eye on tangential and radial surfaces.

Tocoyena amazonica Standl. Field Mus. Bot. 8: 350. 1931.

Tree, from 12 to 50 feet in height. Crown spreading. Trunk bent, round, 7 inches in diameter, and unbranched for about half the entire height. Bark yellow or dark brown, fairly smooth or with few, small lenticels. Leaves glabrous, obovate or oblongate. Fruit round, almost black when mature; June–July.—Not common; in alluvial soil or along banks of streams (alt. 400 ft.).

Sapwood well defined, uniform pale pink and darkening on exposure; heartwood medium brown. Wood odorless, but slightly bitter; interwoven-grained; very fine-textured; fairly light in weight; easy to cut and takes a smooth, dull polish. Growth rings present; indicated by terminal parenchyma. Pores minute or barely distinguishable with lens; fairly numerous, well scattered; solitary, less frequently in small radial multiples. Vessel lines indistinct. Rays numerous and faintly distinguishable with lens on cross section; indistinct or invisible on other surfaces.

Loreto: lower Itaya, *21;* Pebas, *1811.*

Tocoyena foetida Poepp. & Endl. Nov. Gen. & Sp. 3: 25. *pl. 229.* 1845.

Tall shrub, up to 18 feet in height, with few branches and long, slender trunk. Bark pale gray or dark brown, fairly smooth, exfoliating. Leaves lanceolate or obovate-oblong, pubescent beneath. Flowers white, with slender corolla tube. Capsule about 2 inches long, elliptic or oblongate, dark brown; seeds angular, dark brown or almost black; June–July.—Uncommon; in slightly humid loam, forming undergrowth in dense forest (alt. 350 ft.).

Wood creamy white with a pale pinkish cast and darkening slightly on exposure; odorless, but slightly bitter; interwoven-grained; uniformly fine-textured; moderately heavy, strong, and fairly tenacious; easy to work and takes a smooth, dull finish. Growth rings present, but inconspicuous. Parenchyma indistinct. Pores very small; moderately numerous; solitary or in small radial multiples or rows; open. Vessel lines indistinct. Rays numerous,

very fine on cross section; indistinct or invisible with lens on other surfaces.

Loreto: La Victoria, *2617*.

Tocoyena Williamsii Standl. Field Mus. Bot. 6: 349. 1931.

Tree, from 30 to 40 feet in height. Crown conical; branches usually verticillate. Trunk round, about 13 inches in diameter, and either branching 2 or 3 feet from the base or undivided up to two-thirds the entire height. Bark pale or dark purplish brown, fairly smooth or with low, irregular ridges. Leaves up to 13 inches long and about 7 inches wide, obovate or oblanceolate, membranaceous, glabrous. Flowers few, terminal; corolla yellow, fragrant. Capsule round, up to 2.75 inches in diameter, pale brown when ripe.—Rather widely distributed, but not common; in sandy or dry medium loam among shrubs and low trees of secondary growth or in abandoned clearings (alt. 400–1,400 ft.).

Wood uniform grayish, at times turning to yellowish brown on exposure; odorless and tasteless; straight- or interwoven-grained; fine-textured; of medium weight to moderately heavy and brittle; easy to work and takes a smooth polish; checks in drying; fairly durable. Growth rings absent or inconspicuous. Parenchyma faintly distinguishable with lens as numerous, very fine lines extending between the rays. Pores moderately small; numerous, well scattered; solitary or in radial multiples or rows of 2–3, infrequently in diagonal pairs; open. Vessel lines very fine and short; lustrous deposit frequently discernible with lens. Rays numerous, fine or barely distinguishable at limit of vision on moistened cross section; indistinct on tangential; sometimes faintly visible to unaided eye on moistened radial surface. Pith about 0.5 inch in diameter.

San Martín: Tarapoto, *6094*(?).—Loreto: near Iquitos, *8097*.

38. UNCARIA Schreb.

Uncaria guianensis (Aubl.) Gmel. Syst. Veg. 1: 370. 1796. *Garabato.*

An evergreen, subxerophytic shrub, frequently scandent. Bark pinkish or chocolate brown with a grayish cast; inner bark reddish brown, fibrous. Stem armed with strong, recurved spines arranged in pairs. Leaves opposite, short-stalked. Flowers small, in dense globose heads, sessile. Capsule 2-celled, elongate spindle-shaped; seeds numerous and very small.—Fairly common throughout the lowland and occasionally in the upland (alt. 400–2,500 ft.).

Wood pale pinkish brown; straight-grained; coarse-textured; light in weight. Growth rings absent. Parenchyma indistinct. Pores very large; rather numerous and constitute more than half the surface area, but not crowded; solitary, seldom in radial multiples of 2–3; open or filled with yellowish brown deposit. Vessel lines long, coarse, of same color as background or infrequently filled with grayish white deposit. Rays fine; faintly visible with lens on all surfaces. Pith reddish brown, almost 0.5 inch in diameter.

Loreto: lower Itaya, *251;* herbarium material collected also in the lower Huallaga and near Tarapoto.

39. WARSCEWICZIA Klotzsch

Tall shrubs or small to medium-sized trees. Leaves ovate or obovate, pubescent or glabrous, long- or short-stalked. Flowers in dense cymes; corolla orange yellow; one of the calyx lobes expanded into a scarlet bract. Capsule small, brown when mature. Timber is used only to a limited extent locally.

Wood yellowish or pinkish and darkening slightly on exposure to air; fine- or medium-textured; moderately light to fairly heavy, strong, and compact; takes a smooth, rather dull finish. Parenchyma invisible or distinguishable with lens as numerous, very fine lines extending between the rays. Pores small or moderately small; fairly numerous and well distributed; solitary or in small radial multiples, seldom in small clusters; mostly open. Rays numerous, fine, lighter-colored than background on cross section; sometimes visible without lens on all surfaces.

Warscewiczia coccinea (Vahl) Klotzsch, Monatsb. Akad. Berlin 1853: 497. 1853. *Puca-sisa, Quinilla.*

Handsome, showy tree, seldom more than 50 feet in height. Crown round or spreading. Trunk moderately straight, round, slender, and branching from near the base. Bark very thin, rufous brown, fairly smooth or slightly scaly. Leaves long-stalked, obovate or obovate-oblong, up to 16 inches long. Flowers in small, dense cymes, yellowish green, with one of the calyx lobes often expanded into an oblong or elliptic scarlet bract about 4 inches long; corolla yellow.—Common throughout the lowland in dry loam in old clearings and frequent in the upland along wooded slopes; reported also in the forest along the Putumayo River and at La Merced, San Ramón, and other centers in the Chanchamayo Valley (alt. 2,000 ft.).

Wood creamy or canary yellow, occasionally with pale gray streaks and darkening slightly on exposure; has an oily odor, but no distinctive taste; straight- or interwoven-grained; medium-textured; of fairly light or medium weight, firm, but splintery; easy to cut, takes a smooth finish; checks in drying. Growth rings absent or poorly defined. Parenchyma in numerous, very fine lines extending between the rays. Pores of moderately small or medium size; fairly numerous, well distributed; in radial multiples of 2–5 or more, less frequently solitary, seldom in small clusters; infrequently closed. Vessel lines fine and of same color as background; grayish white deposit sometimes present. Rays lighter-colored than background and at limit of vision on cross section; indistinct on tangential; lighter or darker than adjacent elements on radial surface and sometimes visible without lens. Pith pinkish brown, rectangular in outline.

Loreto: lower Itaya, *135;* Caballo-cocha, *2021;* La Victoria, *2693;* upper Itaya, *3438;* near Iquitos, *8021.*

Warscewiczia cordata Spruce ex Schum. in Mart. Fl. Bras. 6, pt. 6: 217. 1889. *Shambo-sisa.*

Small tree, from 30 to 35 feet in height. Crown open. Trunk straight, 8 inches in diameter, often compressed, and unbranched for from 10 to 24 feet. Bark pale gray to dark brown, fairly smooth or scaly. Leaves up to 16 inches long and 7 inches wide, ovate or obovate, pubescent on both surfaces, and with broad midrib. Flowers in dense cymes; corolla orange yellow and one of the calyx lobes extended into an ovate or elliptic bract about 3.25 inches long, of deep scarlet color.—Not common; in open dry loam among low trees and shrubs, also in fairly dense forest (alt. 500–1,500 ft.); collected also by Spruce at Tarapoto, by Tessmann in the forest adjacent to the Pongo de Manserriche, middle Marañón, and by Killip and Smith near the Colonia Perene, Department of Junín (alt. 2,000 ft.).

Wood pinkish or reddish brown, occasionally with yellowish streaks; straight- or interlocked-grained; uniformly fine-textured; heavy, compact, and tough; not difficult to work, takes a smooth and rather dull polish, and holds its place well when finished. Growth rings absent or poorly defined. Parenchyma indistinct. Pores small; fairly numerous and well scattered; in radial multiples of 2–6, less frequently solitary; mostly open. Vessel lines fine, sometimes darker than background owing to deposit of yellowish or dark

brown gum present. Rays numerous, very fine, and closely spaced on cross section; barely discernible with lens on all surfaces.

San Martín: Tarapoto, *5862*.

Warscewiczia Schwackei K. Schum. in Mart. Fl. Bras. 6, pt. 6: 219. *pl. 115*. 1889. *Jayacoma, Tayacona*.

Small tree or tall shrub, 18 feet in height. Bark dark brown, scaly; inner bark chocolate brown. Leaves 7 inches or more in length and 0.75 inch in width, ovate, glabrous, and short-petiolate. Flowers in small, dense cymes, with one of the calyx lobes extended into a scarlet bract, elliptic in outline and about 1 inch long. Capsule small, brown when mature.—Uncommon; along margin of forest in dry loam (alt. 400 ft.).

Sapwood yellow or pale yellowish brown, thin, and fairly well defined; heartwood pinkish brown and darkening on exposure. Wood odorless, but slightly astringent; interlocked-grained; fine-textured; moderately heavy, strong, and compact; not difficult to work; fairly durable. Growth rings present, but not well defined. Parenchyma in numerous, very fine, short lines; indistinct or barely discernible with lens. Pores of small or medium size; not numerous and well scattered; solitary or in radial multiples of 2, seldom in small clusters. Vessel lines indistinct. Rays barely or readily discernible without lens on all surfaces.

Loreto: near Iquitos, *3701*.

COMPOSITAE. Sunflower Family

Herbs, shrubs, or trees. Leaves opposite or alternate, simple or compound. Flowers arranged in heads, surrounded by an involucre composed of few or numerous bracts; flowers usually of two kinds—disk flowers, in the center of the receptacle, usually perfect, with tubular corollas, and marginal or ray flowers, pistillate or sterile, and with long, strap-shaped corollas. Fruit an achene. Although some of the timbers are used locally, they are not of economic importance.

Woods whitish, oatmeal-colored, or pale brown, often with a grayish or purplish cast; fine- or medium-textured; light or very light and soft or firm; fibrous and usually require a sharp knife to cut smoothly across grain; perishable. Parenchyma paratracheal; not abundantly developed and often indistinct. Pores small or medium-sized; fairly numerous or numerous; solitary, less often in small

multiples; open. Rays fine or broad on cross section; indistinct on tangential; rather conspicuous on radial surface.

Vessels have simple perforations; intervascular pits bordered; vessel-ray and parenchyma pits also bordered. Rays heterogeneous; multiseriate (2–5 cells wide), the inner cells short and bordered on one or both sides by one or more layers of high cells.

1. CLIBADIUM Allem.

Clibadium remotiflorum O. E. Schulz, Bot. Jahrb. 46: 621. 1912. *Huaca, Llama-huasca, Sacha-huaca, Uchu-huaca.*

Shrub. Bark dark grayish brown, moderately smooth or with long, shallow ridges; inner bark coarsely fibrous. Leaves opposite, petiolate, ovate, acuminate or obtuse, subrounded or acute at base, serrate-crenate, membranaceous; leaves are ground and used as fish poison. Flowers small, white, disk-like, in cymose panicles. Achene opaque black, compressed.—Common in the lowland; in alluvial soil in thickets or along margin of forest (alt. 400–500 ft.).

Wood almost white or pale brown, often with grayish streaks, and lustrous; has no distinctive odor or taste; straight-grained; medium-textured; light in weight, soft; requires a sharp knife to cut smoothly across grain; perishable. Growth rings and parenchyma indistinct. Pores small; numerous and well distributed; in radial multiples of 2–5 or solitary, infrequently in tangential pairs or in small clusters; open or closed. Vessel lines long and darker than the surrounding elements. Rays fairly broad and discernible to unaided eye on cross section; indistinct on tangential; high, of same color as or darker than background, and distinguishable without lens on radial surface; heterogeneous. Pith large, light or dark brown.

Loreto: lower Itaya, *284;* lower Nanay, *468;* Yurimaguas, lower Huallaga, *4304*(?).

2. OLIGANTHES Cass.

Shrubs or small, seldom medium-sized, trees. Leaves alternate, entire or rarely dentate, tomentose. Heads 1–8-flowered, aggregated in dense corymbiform panicles terminating the stem and branches. Achene ribbed, cylindric, glabrous or pilose; the pappus typically in 2 series, the inner or both sometimes of linear, flat scales twisted toward the apex. Common in clearings. Wood is not used locally.

Wood whitish or pale yellowish to pinkish brown; odorless and tasteless; medium-textured; light in weight, but firm; fibrous, but

takes a fairly smooth and lustrous polish; not durable. Parenchyma paratracheal. Pores of medium size; numerous and well scattered; solitary or in multiples of 2–4, less often in small clusters; open. Rays coarse or moderately coarse and lighter-colored than background on cross section; indistinct on tangential; fairly distinct on radial surface.

Oliganthes discolor (HBK.) Sch. Bip. Linnaea 20: 502. 1847. *Yana-ocuera, Yana-varas.*

Tree, from 15 to 40 feet in height. Crown spreading. Trunk erect, columnar, from 10 to 28 inches in diameter, and clear of limbs up to half the entire height. Bark pale or dark purplish brown, smooth or with long, fine ridges. Leaves glabrous above and grayish-tomentose beneath. Flowers borne at tip of twigs. Fruit an achene; October–November.—Fairly common; in dense forest (alt. 500–1,500 ft.); reported also at Cajamarca, near Pacific coast (alt. 2,800 ft.). Wood is used for kindling and general construction.

Wood uniformly oatmeal-colored; odorless and tasteless; straight- or slightly wavy-grained; moderately fine-textured; fairly light in weight, but firm and strong; easy to cut and takes a smooth finish; not durable. Growth rings absent or poorly defined. Parenchyma indistinct. Pores of fairly small or medium size; not numerous to fairly numerous and well scattered; in radial multiples of 2–5, less frequently solitary, seldom in diagonal or tangential pairs or small clusters; open. Vessel lines fine, of same color as background or slightly darker, and visible without lens. Rays at limit of vision on cross section; indistinct on tangential; distinguishable against the lighter-colored background on radial. Pith pale yellow or light brown, round.

Loreto: near Yurimaguas, *3820, 3995.*—San Martín: Tarapoto, *5610.*

Oliganthes Karstenii Sch. Bip. Linnaea 30: 166. 1859–60. *Ocuera negra, Yana-ocuera.*

Small, fast-growing tree, about 30, infrequently up to 45, feet in height. Crown flat, spreading, or conical. Trunk straight, round, 7 inches or more in diameter, often hollow in the center, and clear of branches for three-fifths the entire height. Bark light to dark purplish brown, smooth, with long fine ridges, or scaly. Twigs tomentose. Leaves green and almost glabrous above, tomentose beneath. Flowers white; June–July.—Fairly common in the lowland;

in dry loam in old clearings (alt. 400 ft.). Wood is used for fuel and to a limited extent for house construction.

Wood pale yellowish brown and highly lustrous; slightly fragrant when fresh, odorless and tasteless when dry; straight- or wavy-grained; medium- to rather coarse-textured; saws woolly and requires a sharp knife to cut smoothly across grain; liable to be damaged by insects. Growth rings absent or poorly defined. Pores of medium size and occasionally visible to unaided eye; not numerous and well distributed; solitary or in radial multiples of 2–3; open. Rays sometimes rather conspicuous and somewhat more distinct on radial surface than in *O. discolor*. Pith pale brown.

Loreto: Pebas, *1608, 1767.*

3. TESSARIA Ruiz & Pavón

Tessaria integrifolia Ruiz & Pavón, Syst. Veg. 213. 1798. *Huapariu, Pajarobobo.*

Fast-growing tree, up to 40, infrequently 50, feet in height. Crown conical. Trunk straight, round, slender, and unbranched up to half the height. Bark chocolate brown, fairly smooth, with numerous, low, vertical ridges, or with few, small excrescences; inner bark coarsely fibrous. Leaves narrowly elliptic or lanceolate-elliptic, acuminate at apex, narrowing to the base, and silky-canescent. Inflorescence corymbose, terminal. Flowers pinkish or lavender-colored; June–September.—Fairly common throughout the lowland; usually in the vicinity of streams or in alluvial soil, sometimes forming almost pure stands; reported also from the region of the Río Perene, at Chosia, Department of Huánuco (alt. 7,000 ft.), near Lima, and in Parinas Valley.

Wood lustrous white or creamy yellow; odorless and tasteless; straight-grained; fine- or medium-textured; very light in weight and soft; requires a sharp knife to cut smoothly across grain, fibrous, but takes a smooth, fairly lustrous finish; perishable. Growth rings absent. Parenchyma indistinct. Pores small; few to fairly numerous and well scattered; solitary or in radial, diagonal, or tangential multiples of 2–3, infrequently in small clusters; open. Vessel lines long and fine; often filled with brown or black gum. Rays fairly fine, evenly spaced, and visible with lens on cross section; indistinct on tangential; lighter or slightly darker than background and sometimes distinguishable to unaided eye on radial. Pith pale or dark brown, septate.

Loreto: lower Nanay, *494;* Pebas, *1863.*—San Martín: Juan Guerra, *6891.*

4. VERNONIA Schreb.

Herbs, shrubs, or small trees. Leaves alternate, toothed or nearly entire, and almost sessile. The many-flowered small heads are sessile or stalked, without rays. Achene 4–10-ribbed; the pappus consists of 2 series, the outer of short bristles, the inner of long bristles. The members of this genus are fast-growing and appear promptly in abandoned clearings.

Wood oatmeal-colored or pale brown, occasionally with a purplish cast; odorless and tasteless; medium-textured; light and soft; requires a sharp knife to cut smoothly across grain; fairly lustrous; perishable. Parenchyma paratracheal; often indistinct with lens. Pores of medium size; fairly numerous and well scattered; solitary, less often in small multiples; open. Rays moderately fine to rather coarse and conspicuous on cross section; indistinct on tangential; distinct on radial surface. Some indication in a few specimens of what appear to be vertical canals, gummosis type, in the rays.

Vernonia baccharoides HBK. Nov. Gen. & Sp. 4: 40. 1820. *Ocuera, Ocuera-común, Purma-caspi.*

Tall shrub or small tree, up to 25, seldom 35, feet in height. Crown conical or irregular. Trunk round, slender, and unbranched up to 10 feet. Bark grayish or purplish brown; inner bark slightly fibrous; wood beneath bark usually chocolate brown. Leaves membranaceous, remotely dentate, densely pubescent beneath. Flowers in terminal panicles, sessile, white, with a honey-like fragrance.—Very common in old clearings throughout the lowland (alt. 400 ft.); said to occur also in the upland.

Wood variable in color from oatmeal to pale brown, in some specimens with a pale grayish pink cast; odorless and tasteless; straight- or slightly wavy-grained; medium- or rather coarse-textured; light in weight, but firm; slightly fibrous, easy to work, and takes a smooth finish having a moderate luster when held to light; perishable. Growth rings absent or present. Parenchyma paratracheal; indistinct. Pores of medium size; fairly numerous, evenly distributed; solitary or in small radial, diagonal, or tangential multiples of 2–3; open. Vessel lines fairly fine, long or short, and at limit of vision; dark brown or black gum sometimes present. Rays lighter-colored than adjacent elements, and prominent on cross section; indistinct or faintly discernible without lens on tangential;

of lighter color than background and producing a silver grain on radial. Pith up to 0.75 inch in diameter, septate.

Loreto: near Iquitos, *1476;* Pebas, *1648, 2046;* La Victoria, *2607.*

Vernonia brachiata Benth.(?), ex Oerst. in Kjoeb. Vidensk. Meddel. 1852: 67. 1852.

Shrub, 10 or 12 feet tall. Bark dark chocolate brown, smooth; inner bark coarsely fibrous. Leaves remotely dentate, short-stalked or sessile, finely pubescent on both surfaces. Flowers white; October. —Uncommon; in dry loam along margin of forest (alt. 400 ft.).

Wood oatmeal-colored or pale brown; odorless and tasteless; straight- or wavy-grained; medium-textured; light in weight, but firm. Growth rings absent. Parenchyma indistinct. Pores fairly small; moderately numerous and well scattered; in small radial, seldom tangential, multiples, less frequently solitary; open. Vessel lines fine and indistinct. Rays fairly fine; faintly visible on cross section and radial section; indistinct on tangential. Pith up to 0.75 inch in diameter, dark chocolate brown, with coarse septa.

Loreto: lower Huallaga, *5151.*

TABLES OF ANATOMICAL CHARACTERS OF PERUVIAN WOODS

The following lists present a summary of the principal characters of the woods described in this publication and are intended to take the place of keys. The inclusion of a family indicates that the respective characters are typical of members within that particular group, but do not necessarily apply to all the species. In some instances, for example, in the case of density, texture, width of rays, etc., the choice of characters has been arbitrary. It is hoped that these tables will prove convenient for reference purpose and useful in the identification of tropical American woods.

Some of the tables are based upon the examination of microscopic slides in the collections at Yale School of Forestry, others include information already published by Solereder (Systematic Anatomy of the Dicotyledons. 1182 pp. ill. 1908), while frequent use has been made of the various lists prepared by Record and published recently by him under the title "Classifications of Various Anatomical Features of Dicotyledonous Woods" (Tropical Woods 47: 12–27. 1936).

TABLE 1

Woods Classified According to Weight

(Arrow indicates variation from the average)

Family	Light	Medium	Heavy
Acanthaceae	×		
Anacardiaceae	×		×
Anonaceae	×		×
Apocynaceae	×		×
Aquifoliaceae		×	
Araliaceae	×→		
Bignoniaceae	×		×
Bixaceae	×→		
Bombacaceae	×→		
Boraginaceae	×→		
Burseraceae	×→		
Capparidaceae	×→		
Caricaceae	×		
Caryocaraceae			←×
Chloranthaceae	×		
Cochlospermaceae	×		
Combretaceae			←×
Compositae	×		
Connaraceae		×	
Dichapetalaceae	×→		
Dilleniaceae			←×
Ebenaceae	×	×	
Elaeocarpaceae		×	×
Erythroxylaceae		×	×
Euphorbiaceae	×		×
Flacourtiaceae	×		×
Gesneriaceae	×		
Guttiferae		←×→	
Hypericaceae		←×	
Icacinaceae		×	×
Juglandaceae	×	×	
Lacistemaceae	×	×	
Lauraceae		←×→	
Lecythidaceae		×	×
Leguminosae	×		×
Loganiaceae	×	×	
Lythraceae		←×→	
Malpighiaceae		×	×

TABLE 1 (*concluded*)

WOODS CLASSIFIED ACCORDING TO WEIGHT

(*Arrow indicates variation from the average*)

Family	Light	Medium	Heavy
Malvaceae	×→		
Marcgraviaceae		×	
Melastomaceae	×		×
Meliaceae		←×→	
Menispermaceae			×
Monimiaceae	×	×	
Moraceae	×		×
Myristicaceae		←×→	
Myrsinaceae		×	
Myrtaceae		×	×
Nyctaginaceae	×		
Ochnaceae	×		×
Olacaceae		←×→	
Onagraceae	×		
Piperaceae	×		×
Polygonaceae		←×→	
Proteaceae		×	×
Rhamnaceae		×	×
Rosaceae		×	×
Rubiaceae		×	×
Rutaceae		←×	×
Sabiaceae	×→		
Salicaceae	×		
Sapindaceae		←×→	
Sapotaceae			←×
Simarubaceae		×	
Solanaceae	×		
Staphyleaceae		×	
Sterculiaceae	×→		
Theaceae		×→	
Theophrastaceae	×→		
Thymelaeaceae	×→		
Tiliaceae	×		×
Ulmaceae	×→		
Urticaceae	×		
Verbenaceae		←×→	
Violaceae		×	
Vochysiaceae		×	

TABLE 2

WOODS WITH CHARACTERISTIC ODOR OR TASTE

Family	Odor	Taste
Acanthaceae		
Trichanthera	Occasionally slightly fetid	
Anacardiaceae		
Mangifera	Slightly fragrant when fresh	Fruit has a strong flavor suggesting turpentine
Anonaceae		
Diclinanona	Agreeable when fresh	
Duguetia	Slightly fragrant or fetid	
Guatteria	Spicy	
Unonopsis	Faintly fragrant	Slightly bitter
Xylopia		Astringent
Apocynaceae		
Aspidosperma	Fragrant at times	
Malouetia	Suggesting vinegar	Slightly bitter
Rauwolfia		Slightly bitter
Thevetia		Bitter
Araliaceae		
Didymopanax		Bark bitter
Boraginaceae		
Cordia	Leaves of *C. alliodora* have odor suggesting garlic	
Burseraceae		
Protium	Leaflets have a strong odor suggesting gum arabic	
Bignoniaceae		
Tabebuia	Slightly fragrant when fresh	
Capparidaceae		
Capparis	Garlic-like when fresh; occasionally fetid	
Crataeva	Garlic-like when fresh; occasionally fetid	
Ebenaceae		
Diospyros	At times fragrant	
Euphorbiaceae		
Croton	Spicy, suggesting cinnamon bark, when fresh	
Hura		Slightly astringent
Sapium	Slightly fetid when fresh	

TABLE 2 (*continued*)

WOODS WITH CHARACTERISTIC ODOR OR TASTE

Family	Odor	Taste
Flacourtiaceae		
Carpotroche	At times nauseous when fresh	
Patrisia		Astringent
Guttiferae		
Symphonia	Strongly fetid when freshly cut	
Lauraceae		
Acrodiclidium	Spicy	Bitter
Ajouea	Slightly fragrant	
Endlicheria	Spicy	
Nectandra	Faintly to distinctly fragrant	
Ocotea	Suggests turpentine	Slightly bitter
Pleurothyrium	Faintly fragrant	
Lecythidaceae		
Grias		Slightly bitter
Gustavia	Strongly fetid, pronounced when fresh	
Leguminosae		
Caesalpinia	Rancid	
Cassia	Occasionally fetid	
Lonchocarpus		Slightly bitter
Myroxylon	Pronounced spicy when freshly cut	
Pterocarpus	Slightly fetid when fresh	
Swartzia	Occasionally slightly fetid when fresh	
Lythraceae		
Lagerstroemia	Sometimes offensive when fresh	
Malpighiaceae		
Spachea		Bitter
Melastomaceae		
Bellucia	Slightly fragrant	
Calyptrella	Fragrant	Slightly bitter
Henriettella		Bitter
Miconia		Occasionally slightly bitter
Meliaceae		
Cedrela	Fragrant	Seeds and bark bitter
Guarea	At times fragrant	
Melia	Slightly fragrant when fresh	
Swietenia	Distinctly fragrant when fresh	Seeds and bark bitter, suggesting quinine
Trichilia	Slightly fragrant	Occasionally bitter

TABLE 2 (*concluded*)

WOODS WITH CHARACTERISTIC ODOR OR TASTE

Family	Odor	Taste
Monimiaceae		
Siparuna	Fresh wood, leaves, and fruit distinctly spicy	
Moraceae		
Clarisia	Slightly fetid	
Coussapoa	Fragrant when fresh	
Myristicaceae		
Virola	Some specimens slightly fragrant or fetid when freshly cut	
Piperaceae		
Piper	Some species fetid; leaves often aromatic	
Rosaceae		
Couepia	Sometimes pleasant	
Rubiaceae		
Coussarea		Slightly bitter
Coutarea		"
Ferdinandusa		"
Genipa		"
Gonzalagunia		"
Hamelia		"
Isertia		"
Ladenbergia		"
Machaonia		"
Pentagonia		"
Remijia		"
Sickingia		"
Tocoyena		"
Rutaceae		
Dictyoloma	Faintly pleasant	Slightly bitter
Erythrochiton	"	Astringent
Zanthoxylum	"	Occasionally slightly bitter
Sapotaceae		
Sideroxylon		Slightly bitter
Simarubaceae		
Picramnia		Very bitter
Solanaceae		
Cestrum		Occasionally slightly bitter
Cyphomandra	Disagreeable	
Thymelaeaceae		
Schoenobiblus	Pleasant	Slightly bitter
Vochysiaceae		
Vochysia		Slightly bitter

TABLE 3

WOODS CLASSIFIED ACCORDING TO TEXTURE

(Arrow indicates variation from the average)

Family	Fine	Medium	Coarse
Acanthaceae	×		×
Anacardiaceae		×	×
Anonaceae	×		×
Apocynaceae	×	×	
Aquifoliaceae	×		
Araliaceae		←×	×
Bignoniaceae	×	×	
Bixaceae	×	×	
Bombacaceae			×
Boraginaceae	×	×	
Burseraceae	×	×	
Capparidaceae	×		×
Caryocaraceae		×	×
Chloranthaceae		←×	
Cochlospermaceae			×
Combretaceae		×	×
Compositae	×	×	
Connaraceae		×	
Dichapetalaceae	×	×	
Dilleniaceae			×
Ebenaceae	×→		
Elaeocarpaceae		×	×
Erythroxylaceae	×	×	
Euphorbiaceae	×		×
Flacourtiaceae	×	×	
Gesneriaceae			×
Guttiferae		←×→	
Hypericaceae		×→	
Icacinaceae		×	
Juglandaceae		×	×
Lacistemaceae		×→	
Lauraceae		←×→	
Lecythidaceae	×		×
Leguminosae		×	×
Loganiaceae	×		
Lythraceae		←×	
Malpighiaceae		←×	
Malvaceae	×→		

TABLE 3 (*concluded*)

WOODS CLASSIFIED ACCORDING TO TEXTURE

(*Arrow indicates variation from the average*)

Family	Fine	Medium	Coarse
Marcgraviaceae			×
Melastomaceae	×	×	
Meliaceae		×	×
Menispermaceae	×		
Monimiaceae	×		
Moraceae		×	×
Myristicaceae		←×	
Myrsinaceae	×	×	
Myrtaceae		×	
Nyctaginaceae	×→		
Ochnaceae	×	×	
Olacaceae	×	×	
Onagraceae		←×	
Piperaceae		←×	
Polygonaceae	×	×	
Proteaceae	×	×→	
Rhamnaceae	×		
Rosaceae		×	×
Rubiaceae	×→		
Rutaceae		←×	
Sabiaceae		←×	
Salicaceae		×	
Sapindaceae		←×→	
Sapotaceae		←×→	
Simarubaceae		←×	
Solanaceae		←×→	
Staphyleaceae		×	
Sterculiaceae		×	×
Theaceae	×	×	
Theophrastaceae	×		
Thymelaeaceae	×→		
Tiliaceae		×	×
Ulmaceae		×→	
Urticaceae		×→	
Verbenaceae	×	×→	
Violaceae	×		
Vochysiaceae		←×	

TABLE 4

RING-POROUS WOODS

Araliaceae
Gilibertia
Boraginaceae
Cordia
Ebenaceae
Diospyros
Erythroxylaceae
Erythroxylon
Hypericaceae
Vismia (occ.)
Juglandaceae
Juglans (semi)
Leguminosae
Acacia?
Entada?
Pterocarpus (semi)
Lythraceae
Lagerstroemia
Malvaceae
Sida
Meliaceae
Cedrela
Melia
Sterculiaceae
Sterculia
Rhamnaceae
Rhamnus
Verbenaceae
Lippia
Vitex (semi)

TABLE 5

Arrangement of Parenchyma

(Based upon examination with 14× lens)

Family	Arrangement: Paratracheal	Metatracheal	Terminal	Indistinct or Invisible	Remarks
Acanthaceae		×		×	Fine lines between rays
Anacardiaceae	×	×		×	Occasionally in concentric bands
Anonaceae		×			Characteristic spider-web arrangement
Apocynaceae		×	×		Fine tangential lines or concentric bands; often hoary
Araliaceae	×			×	
Bignoniaceae	×				Also aliform or confluent
Bixaceae		×			Numerous short wavy lines
Bombacaceae		×			Fine wavy tangential lines
Boraginaceae	×	×			Diagonal, tangential, or concentric lines
Burseraceae	×	×		×	Broken tangential lines or concentric bands
Capparidaceae	×	×			Tangential lines or concentric bands; often conspicuous
Caryocaraceae	×	×			Fine lines from ray to ray; often hoary
Chloranthaceae				×	
Cochlospermaceae		×			Broad irregularly spaced concentric bands
Combretaceae	×	×		×	Tangential lines or bands
Compositae	×			×	
Connaraceae		×			Evenly or unevenly spaced concentric lines or bands
Dichapetalaceae		×			Numerous very fine hoary tangential bands
Dilleniaceae		×		×	Numerous very fine lines
Ebenaceae		×			Fine concentric lines forming network with rays
Elaeocarpaceae		×		×	Fine lines between rays
Erythroxylaceae	×	×		×	Fine tangential lines or fine to distinct concentric bands
Flacourtiaceae	×	×		×	Numerous fine bands between rays
Gesneriaceae	×				At times aliform or confluent
Guttiferae	×	×		×	Occasionally confluent or in fine tangential or concentric bands forming network with rays
Hypericaceae	×	×			Broken or continuous concentric lines forming network
Icacinaceae		×			Tangential lines between rays
Juglandaceae		×			Fine broken concentric bands or lines
Lacistemaceae		×		×	Very fine tangential bands between rays
Lauraceae	×	×		×	Often sparingly developed around pores or at times distinct even without lens
Lecythidaceae		×			Numerous fine tangential or concentric lines forming network with rays
Leguminosae	×	×	×		Abundantly developed and often distinct
Loganiaceae		×			Numerous concentric lines or fine bands
Lythraceae	×	×	×	×	Aliform, confluent, or in tangential bands
Malpighiaceae	×	×		×	Broken or continuous concentric bands; at times distinct

TABLE 5 (*concluded*)

ARRANGEMENT OF PARENCHYMA

(*Based upon examination with 14× lens*)

FAMILY	ARRANGEMENT				REMARKS
	Paratracheal	Metatracheal	Terminal	Indistinct or Invisible	
Malvaceae	×	×		×	Numerous minute lines forming network with rays
Marcgraviaceae	×				Sparingly developed
Melastomaceae	×	×			Fine tangential lines or concentric bands; indistinct or distinct
Meliaceae	×	×	×		Tangential or concentric lines or bands
Menispermaceae	×	×			Very fine tangential lines
Monimiaceae		×	×	×	Very fine lines between rays
Moraceae	×	×	×		Fine broken or continuous lines or bands
Myristicaceae		×	×	×	Widely and unevenly spaced
Myrsinaceae	×			×	Sparingly developed
Myrtaceae	×	×			Exceedingly fine lines between rays, often uniting pores
Nyctaginaceae	×			×	Sparingly developed
Ochnaceae	×			×	
Olacaceae		×			Numerous tangential lines between rays or hoary concentric lines
Onagraceae	×			×	
Piperaceae	×			×	Or readily visible
Polygonaceae	×	×	×		Often sparingly developed
Proteaceae	×	×			Numerous lines stretched hammock-like between rays
Rhamnaceae	×	×	×		Broken tangential lines or fine concentric bands
Rosaceae		×			Numerous tangential or concentric lines forming network with rays
Rubiaceae	×	×	×		Mostly in fine lines between rays or in concentric lines or fine bands
Rutaceae	×	×	×		Fine concentric bands or lines
Sabiaceae	×	×			Unevenly spaced concentric lines or fine bands
Salicaceae			×		Indistinct narrow bands
Sapindaceae	×	×	×	×	Aliform, also in broken or continuous concentric bands or lines
Sapotaceae		×			Numerous fine tangential lines or concentric bands
Simarubaceae				×	
Solanaceae	×			×	
Staphyleaceae				×	
Sterculiaceae	×	×	×		Fine tangential lines or concentric bands
Theaceae	×			×	
Theophrastaceae				×	
Thymelaeaceae	×	×	×		Confluent and in irregular terminal lines or bands
Tiliaceae	×	×	×	×	Irregular tangential lines; often in fine network
Ulmaceae	×			×	Sparingly developed
Verbenaceae	×		×	×	Usually scantily developed
Violaceae	×	×		×	Sparingly developed; at times in numerous fine lines between rays
Vochysiaceae	×	×	×		Distinct about pores and in broad tangential or concentric bands

TABLE 6

Woods with Distinct or Conspicuous Rays

The size and prominence of the rays in a wood are important criteria for identification and classification. Many temperate genera, such as *Quercus*, *Fagus*, *Alnus*, and *Platanus*, have large and conspicuous rays and usually can be identified readily, even without the use of a hand lens. Among tropical woods there is an even larger number of genera having conspicuously large rays. It is impossible to draw a fast line between the woods which have broad rays and those which do not, for they show a complete line of gradation from fine or exceedingly fine, uniseriate rays, to those that are exceedingly large or prominent and composed of parenchymatous tissue. The relative prominence of rays on cross and tangential sections is largely dependent upon their width; on the radial surface the determining factors are depth and color contrast.

The families and genera of Peruvian woods having distinct rays are as follows:

Anonaceae.—Fairly distinct to conspicuously broad.

Aquifoliaceae (*Ilex*).—Conspicuous.

Araliaceae.—Often widely spaced on cross section and strikingly conspicuous; distinct also on other surfaces.

Bombacaceae.—Usually high and conspicuous on radial surface.

Boraginaceae (*Cordia*).—Distinct on all surfaces.

Capparidaceae (*Crataeva*).—Readily visible on cross and radial sections, but not on tangential.

Chloranthaceae (*Hedyosmum*).—Distinct on all surfaces, often beech-like.

Cochlospermaceae (*Cochlospermum*).—Distinct on all surfaces.

Compositae.—Fairly distinct to distinct on cross and radial sections; sometimes large enough to produce a distinct figure on quarter-sawed material.

Connaraceae (*Connarus*).—Fairly distinct on radial surface.

Dilleniaceae (*Curatella*).—Conspicuous and sometimes oak-like.

Elaeocarpaceae (*Muntingia, Sloanea*).—Fairly broad or broad on cross section; distinct to moderately so on tangential and radial surfaces.

Euphorbiaceae (*Acalypha, Aparisthmium, Hevea, Hura, Jatropha, Mabea, Phyllanthus, Ricinus, Sapium*).—Sometimes fairly distinct on radial surface.

Flacourtiaceae (*Carpotroche, Casearia, Lindackeria, Lunania, Mayna, Patrisia, Tetrathylacium*).—Occasionally fairly distinct on cross and radial sections, at times on tangential.

Gesneriaceae (*Drymonia*).—Fairly distinct on radial surface, but moderately fine on cross section.

Guttiferae (*Chrysochlamys, Clusia, Rheedia*).—Fine to fairly broad on cross section; sometimes distinct on radial surface.

Hypericaceae (*Vismia*).—Distinct on radial surface; moderately distinct on tangential.

Icacinaceae (*Poraqueiba*).—Fine to moderately broad on cross section; distinct or fairly distinct on radial.

Juglandaceae (*Juglans*).—Rather distinct on radial surface.

Lacistemaceae (*Lacistema*).—Sometimes distinct on radial surface.

Lauraceae (*Acrodiclidium, Ajouea, Aniba, Hufelandia, Nectandra, Ocotea, Persea, Pleurothyrium, Phoebe*).—Fairly distinct; sometimes conspicuous on radial surface.

TABLE 6 (*concluded*)

WOODS WITH DISTINCT OR CONSPICUOUS RAYS

Lecythidaceae (*Gustavia*).—Very broad and conspicuous on cross section; fairly distinct on tangential; rather high and distinct on radial surface, in some species producing a rather conspicuous silver grain.

Leguminosae (*Bauhinia, Caesalpinia, Calliandra, Campsiandra, Cassia, Copaifera, Crudia, Cynometra, Dalbergia, Dialium, Entada, Erythrina, Hymenaea, Inga, Lonchocarpus, Macrolobium, Piptadenia, Schizolobium*).—Fairly distinct to broad and conspicuous on cross section; less frequently very distinct on radial surface.

Lythraceae (*Adenaria, Lagerstroemia, Physocalymma*).—At times appearing considerably darker than background and distinct on radial surface.

Malpighiaceae (*Bunchosia, Byrsonima*).—Low, but fairly or very distinct on radial surface.

Malvaceae (*Hibiscus*).—Fine or fairly broad on cross section; moderately distinct on radial surface.

Melastomaceae (*Bellucia, Leandra, Tibouchina*).—Fairly distinct or distinct on radial surface; moderately broad on cross section in *Leandra*.

Meliaceae (*Swietenia*).—Distinct or conspicuous on radial surface, where they appear either lighter or darker than background and sometimes add materially to the figure of quarter-sawed lumber.

Menispermaceae (*Abuta*).—Fine, but visible on cross section; distinct on tangential and radial surfaces.

Monimiaceae (*Mollinedia, Siparuna*).—Fine to fairly broad on cross section; fairly distinct and high on radial.

Moraceae.—Sometimes broad on cross section; fairly distinct or distinct on radial.

Myristicaceae.—Sometimes broad on cross section; distinct on radial and often very coarse-celled.

Myrsinaceae (*Rapanea*).—Broad, conspicuous, and widely spaced on cross section; fairly distinct on radial, considerably darker than background, resembling sycamore (*Platanus*), and give a pronounced silver grain.

Piperaceae (*Piper*).—Broad or very broad on cross section; distinct or exceedingly distinct and high on radial.

Polygonaceae (*Symmeria*).—Distinct on all surfaces.

Proteaceae.—Characterized by conspicuously broad, often oak-like rays which show on tangential surface as spindle-shaped masses.

Rosaceae.—Moderately distinct to distinct on radial surface.

Sabiaceae (*Ophiocaryon*).—Fairly distinct on radial surface.

Simarubaceae (*Picramnia*).—Fairly broad on cross section; moderately distinct on radial.

Solanaceae.—Fairly broad on cross section and distinct on radial.

Staphyleaceae (*Turpinia*).—Moderately distinct on all surfaces.

Sterculiaceae (*Sterculia, Theobroma*).—Have strikingly large rays.

Theophrastaceae (*Clavija*).—Distinct on all surfaces and suggesting sycamore (*Platanus*).

Urticaceae.—Moderately broad on cross section; fairly distinct to distinct on radial.

Vochysiaceae (*Vochysia*).—Rather coarse on cross section; distinct on tangential; producing a fairly distinct silver grain on radial surface.

TABLE 7

Woods with "Ripple Marks" or Storied Structure

These are the fine transverse striations or file-like markings appearing on the tangential surface of woods having some or all of their elements in horizontal seriation. Such a structure is said to be storied or tier-like. Parenchyma with a definite number of cells per strand may be present in sufficient amount to produce a secondary seriation not visible without lens.

Below is a list of families and genera of woods with storied structure. The asterisk indicates that not all elements are storied.

Bignoniaceae
- *Crescentia*
- *Tabebuia* (*Tecoma*)

Bixaceae
- *Bixa*

Bombacaceae
- *Bombax**

Cochlospermaceae
- *Cochlospermum*

Elaeocarpaceae
- *Muntingia**

Leguminosae
- *Bauhinia*
- *Caesalpinia*
- *Dalbergia*
- *Dialium*

Leguminosae (*cont.*)
- *Erythrina**
- *Lonchocarpus*
- *Myroxylon*
- *Pithecolobium* (occ.)
- *Poeppigia*
- *Pterocarpus*
- *Swartzia*

Malvaceae
- *Hibiscus*

Meliaceae
- *Carapa* (occ.)
- *Cedrela* (occ.)
- *Swietenia*

Moraceae
- *Ficus* (occ.)

Piperaceae
- *Piper** (occ.)

Sterculiaceae
- *Guazuma**
- *Sterculia**

Thymelaeaceae
- *Schoenobiblus*

Tiliaceae
- *Apeiba**
- *Heliocarpus**
- *Luehea*
- *Mollia**

Ulmaceae

Urticaceae
- *Urera**

TABLE 8

Occurrence of Raphides

Raphides are needle-like crystals of calcium oxalate of rather wide distribution in parenchymatous tissues of certain dicotyledonous plants. According to Hess (Occurrence of raphides in wood, Tropical Woods 46: 22–31, June 1, 1936) the crystals lie parallel to each other, forming sheaf-like bundles. They sometimes occur in such abundance, as in some members of Nyctaginaceae, as to impart a silvery gray color to a freshly sawed surface. Often they occur in the phloem when they are absent from the xylem, and it is not uncommon to find them in the pith also.

Raphides have been observed in the following Peruvian woods:

Dilleniaceae

Curatella americana L.—in ray cells.

Marcgraviaceae

Marcgravia sp.—in ray cells.

Meliaceae

Gilibertia Williamsii Harms—in pith.

Monimiaceae

Siparuna thecaphora (P. & E.) A. DC.—in pith.

Nyctaginaceae—crystal bundles very numerous and large, often readily visible with the lens; in parenchyma associated with included phloem.

Neea divaricata P. & E.
Neea floribunda P. & E.
Neea parviflora P. & E.
Neea Spruceana Heimerl
Neea subpubescens Heimerl
Torrubia myrtiflora Standl.

Rubiaceae

Faramea amplifolia Standl.—in rays only.
Faramea anisocalyx P. & E.
Faramea capillipes Muell.
Faramea maynensis Spruce
Faramea quinqueflora P. & E.
Faramea rectinervia Standl.
Psychotria alba R. & P.—in rays and sometimes in wood parenchyma.

Sapotaceae

Sideroxylon Williamsii Baehni—in pith.

TABLE 9

Woods with Special Structure

Laticiferous tubes or cells (connecting with vertical tubes in the bark or pith or both): some Anacardiaceae, Apocynaceae, and Moraceae.
Oil cells: Anonaceae, Lauraceae, and Myristicaceae.
Aggregates of resinous cells in the rays: Myrsinaceae.
Tanniniferous tubes: Myristicaceae.

TABLE 10

Intercellular Canals

The following notes are extracts from articles published by Record in Journ. of Forestry 16: 4: 428–441. 1918; idem 19: 3: 1–12. 1921; Tropical Woods 4: 17–20. 1925; Timbers of North America 72–81. 1934.

The common forms of intercellular canals in dicotyledonous woods are usually known as gum ducts, although their contents vary greatly in composition and may be resinous, oily, gummy, mucilaginous, etc. The canals are of two kinds with respect to position in the tree, namely (1) vertical or axial, and (2) horizontal or radial.

Vertical canals are of two types, as regards their origin, namely (1) normal or natural, and (2) traumatic or pathological. The latter are of more common occurrence than the others and appear to result from the breaking down (gummosis) of the structure. Such canals are in concentric or tangential rows. Normal canals are sometimes solitary, but more often in tangential arrangement.

Radial canals are also of two types, which, for lack of a better classification, are designated as (1) small, and (2) large. Small radial canals seem to be of normal occurrence in all cases. They vary considerably in size, but usually are large enough to be seen with a hand lens and not infrequently by the unaided eye. The canals have oily or gummy contents which are likely to exude and stain the specimen, thus adding decidedly to their visibility. Radial canals of the large type are empty and dry, and they vary in size, roughly, from that of a pinpoint to 0.5 inch in height and 0.125 inch across.

Radial phloem bridges in the rays of some anomalous woods may appear like large radial ducts, especially when the unlignified tissue has disintegrated.

The families and genera of Peruvian woods having intercellular canals are the following:

Vertical–normal	Vertical–gummosis type	Radial–small	Radial–large
Leguminosae	Bombacaceae	Anacardiaceae	Apocynaceae
Copaifera	*Bombax*	*Astronium*	*Aspidosperma*
	Boraginaceae	*Spondias*	*Couma*
	Cordia	*Tapirira*	*Macoubea*
	Combretaceae	Araliaceae	*Malouetia*
	Terminalia	*Didymopanax*	*Parahancornia*
	Elaeocarpaceae	*Gilibertia*	*Plumeria*
	Sloanea	*Nothopanax*	*Rauwolfia*
	Lecythidaceae	*Oreopanax*	*Tabernaemontana*
	Lecythis	Burseraceae	*Thevetia*
	Leguminosae	*Protium*	*Zschokkea*
	Hymenaea	Guttiferae	Euphorbiaceae
	Macrolobium	*Rheedia*	*Alchornea*
	Malvaceae		*Croton*
	Hibiscus		*Mabea*
	Tetrasida(?)		*Pera*
	Meliaceae		*Sapium*
	Carapa		Solanaceae
	Cedrela		*Cestrum*
	Melia		*Solanum*
	Swietenia		
	Myrtaceae		
	Eucalyptus		
	Rutaceae		
	Citrus		
	Zanthoxylum		
	Sterculiaceae		
	Sterculia		
	Theobroma		
	Vochysiaceae		
	Vochysia		

TABLE 11

Type of Perforations in the Vessels

(Arrow indicates tendency from prevailing type)

Family	Simple	Multiple
Acanthaceae	×	
Anacardiaceae	×→	
Anonaceae	×	
Apocynaceae	×	
Aquifoliaceae		×
Araliaceae	×→	
Bignoniaceae	×	
Bixaceae	×→	
Bombacaceae	×	
Boraginaceae	×	
Burseraceae	×	
Capparidaceae	×	
Caricaceae	×	
Caryocaraceae	×→	
Chloranthaceae		×
Cochlospermaceae	×→	
Combretaceae	×	
Compositae	×	
Connaraceae	×	
Dilleniaceae		←×
Dichapetalaceae	×→	
Ebenaceae	×	
Elaeocarpaceae	×→	
Erythroxylaceae	×→	
Euphorbiaceae	×→	
Flacourtiaceae	×→	
Gesneriaceae	×	
Guttiferae	×	
Hypericaceae	×	
Icacinaceae		←×
Juglandaceae	×→	
Lacistemaceae		×
Lauraceae	×→	
Lecythidaceae	×	
Leguminosae	×	
Loganiaceae	×→	
Lythraceae	×	
Malpighiaceae	×	
Malvaceae	×	
Marcgraviaceae	×→	
Melastomaceae	×	
Meliaceae	×	
Menispermaceae	×	
Monimiaceae		←×
Moraceae	×	
Myristicaceae		←×
Myrsinaceae	×→	
Myrtaceae	×	
Nyctaginaceae	×→	
Ochnaceae	×→	
Olacaceae	×→	
Onagraceae	×→	
Piperaceae	×→	
Polygonaceae	×	
Proteaceae	×	
Rhamnaceae	×	
Rosaceae	×→	
Rubiaceae	×→	
Rutaceae	×→	
Sabiaceae		×
Salicaceae	×	
Sapindaceae	×	
Sapotaceae	×→	
Simarubaceae	×	
Solanaceae	×	
Staphyleaceae		←×
Sterculiaceae	×	
Theaceae		←×
Theophrastaceae	×	
Thymelaeaceae	×	
Tiliaceae	×	
Ulmaceae	×→	
Urticaceae	×	
Verbenaceae	×→	
Violaceae		←×
Vochysiaceae	×	

TABLE 12

Woods with Vestured Pits

In certain dicotyledonous woods the bordered pits have a punctate or sieve-like appearance. According to Bailey (Tropical Woods 31: 46–48, Sept. 1932; Journ. Arnold Arboretum 14: 259–293. 1933), this results from the presence of minute but highly refractive outgrowths from the free surfaces of the secondary wall, which line the cavity wholly or in part. Such pits are referred to as vestured, a new term for pits with cribriform membrane.

Among the families with vestured pits listed by Bailey the following are represented in the Peruvian collection:

Apocynaceae
Capparidaceae
Combretaceae
Euphorbiaceae (Bridelieae only)
Leguminosae (except Bauhinieae)
Loganiaceae
Lythraceae
Malpighiaceae
Melastomaceae
Myrtaceae
Ochnaceae (Exalbuminosae only)
Polygonaceae
Rubiaceae
Thymelaeaceae
Vochysiaceae

TABLE 13

Nature of Vessel-Ray Pit-Pairs

Pit-pairs between the ray cells and vessels are very distinctive and while always simple on the ray side they may be simple or half-bordered on the vessel side. According to Frost (Bull. Torrey Bot. Club 56: 259–263. 1929) the parenchyma member of a vessel-ray pit-pair sometimes has a narrow border.

Family	Simple	Half-bordered	Remarks
Acanthaceae	×	×	Often elongated and in scalariform arrangement
Anacardiaceae	×	×	Large, irregular, resembling scalariform perforation; the two types together
Anonaceae		×	Small or large and covering two or more vessels
Apocynaceae		×	
Aquifoliaceae		×	
Araliaceae	×		Large, irregular, elliptical
Bignoniaceae		×	Small
Bixaceae	×	×	Simple pits sometimes large
Bombacaceae	×		Large
Boraginaceae		×	
Burseraceae	×	×	Very large, elongated
Capparidaceae		×	Varying in size and similar to intervascular pits
Caryocaraceae	×	×	Small to fairly large
Cochlospermaceae	×		
Combretaceae		×	
Compositae		×	
Connaraceae	×	×	
Dichapetalaceae		×	
Ebenaceae		×	
Erythroxylaceae	×	×	Small, circular to much elongated
Euphorbiaceae	×	×	Few, very large, rounded or elongated
Flacourtiaceae	×	×	Very small
Gesneriaceae	×	×	
Guttiferae	×	×	Large, often elongated laterally or vertically, to small
Hypericaceae	×	×	Usually not large
Icacinaceae		×	
Juglandaceae	×	×	Numerous, elliptical
Lacistemaceae	×	×	Small
Lauraceae	×	×	Often simple, elongated, and more or less scalariform
Lecythidaceae	×		Small to large
Leguminosae		×	
Loganiaceae	×	×	Often large, elongated
Lythraceae	×		Large and elongated, often in scalariform arrangement

TABLE 13 (*concluded*)

NATURE OF VESSEL-RAY PIT-PAIRS

Family	Simple	Half-bordered	Remarks
Malpighiaceae		×	Very numerous, small
Malvaceae	×	×	Mostly small
Marcgraviaceae		×	Numerous, minute
Melastomaceae	×	×	
Meliaceae		×	Very small, in the ray side often elongated and include several in the vessel
Menispermaceae		×	
Monimiaceae	×	×	Small to large and elliptical
Moraceae	×	×	Often large and elongated
Myristicaceae	×	×	Large, resembling wide gashes
Myrsinaceae	×		
Myrtaceae		×	
Nyctaginaceae		×	Often elongated vertically or laterally
Ochnaceae		×	Very small, numerous
Olacaceae	×	×	Often very large, rounded or elongated, and scalariform
Onagraceae	×		
Polygonaceae		×	Large, with open orifices, with transitions to simple
Proteaceae		×	Very small
Rhamnaceae		×	
Rosaceae	×	×	Simple pits often elongated and in scalariform arrangement
Rubiaceae		×	Small, often in reticulate arrangement
Rutaceae		×	Those in parenchyma often lattice-like and extending over 2 or 3 in vessel
Sabiaceae	×	×	Fairly large
Salicaceae	×		Of same size as intervascular
Sapindaceae		×	
Sapotaceae	×	×	Simple pits large, elliptical or much elongated
Simarubaceae		×	Large, round
Solanaceae	×	×	Often large, the two types together or independent
Staphyleaceae	×		
Sterculiaceae		×	
Theaceae		×	Fairly large
Tiliaceae	×	×	
Ulmaceae	×	×	Often much elongated laterally
Urticaceae	×	×	
Verbenaceae	×	×	Fairly large
Violaceae	×	×	
Vochysiaceae		×	Fairly large, variable in outline, open-mouthed

TABLE 14

Type of Rays

Family	Homogeneous	Heterogeneous	Number of cells wide[1]	Number of cells high[2]
Acanthaceae		×	1–5	–40–
Anacardiaceae		×	1–6	Many
Anonaceae	×→[3]		–3–9	–100
Apocynaceae		×	1–3	–15
Araliaceae		←×	2–10	Few
Bignoniaceae	×→		1–3	–15
Bixaceae		×	2–6	Few
Bombacaceae		×	2–9	Many
Boraginaceae		×	3–5	Few
Burseraceae		×	1	
Capparidaceae	×→		1–3	Few
Caryocaraceae		×	1–3–4	–50–
Chloranthaceae		×		Many
Cochlospermaceae		×		Few
Combretaceae		×	1	1–15
Compositae		×	2–5	Few
Connaraceae		×	1–3	Few
Dichapetalaceae		×	1–4	Few–many
Dilleniaceae		×	–15–	Many
Ebenaceae		×	1	Few
Elaeocarpaceae		←×	4–6	Many
Erythroxylaceae		×	1–3	Few
Euphorbiaceae		×	1–3	Few–many
Flacourtiaceae		×	1–3–4	–75
Guttiferae		×	1–7	–90–
Hypericaceae		×	2–3	–90–
Icacinaceae		×	2–20	Many
Juglandaceae		×	1–3	–30
Lacistemaceae		×	1–3	–20–
Lauraceae		←×	1–3	15–40
Lecythidaceae	×	×	1–9	5–50
Leguminosae	×	×	1–4	Few–many
Loganiaceae		×	1–2	Few
Lythraceae		←×	1–3	–25
Malpighiaceae		←×	1–4	–20
Malvaceae		←×	1–4	–30

[1] For genera with uniseriate or partly biseriate rays see Table 15.

[2] –20– indicates up to 20 cells or more high; –40– indicates up to 40 or more, etc.

[3] Arrow indicates tendency from the average.

TABLE 14 (*concluded*)

TYPE OF RAYS

Family	Homogeneous	Heterogeneous	Number of cells wide[1]	Number of cells high[2]
Marcgraviaceae		×		
Melastomaceae		×	1–2	–30
Meliaceae		×	1–5	–50
Menispermaceae		×		Many
Monimiaceae		×	1–4	
Moraceae	×	×	1–5	–50–
Myristicaceae		×	1–2	–40
Myrsinaceae		×	2–6	–40–
Myrtaceae		←×[3]	1–2–	Few
Nyctaginaceae		←×	1	Few
Ochnaceae		×	1–8	–40
Olacaceae		×	1	
Piperaceae		×	–15–	Many
Polygonaceae	×	×	1–	–20
Proteaceae	×→		2–10–	Many
Rosaceae		×	1–2	
Rubiaceae		×	1–4	–40
Rutaceae	×→		1–4	–40
Sabiaceae		×	1	Few
Salicaceae		×	1–2	
Sapindaceae		×	1–2	–20
Sapotaceae		×	1–3	Few–many
Simarubaceae			1–5	–100
Solanaceae		×	1–4	6–25
Staphyleaceae		×	1–4	–50
Sterculiaceae		×		Few–many
Theaceae		×	1–5	Few–many
Theophrastaceae		×	–10–	–60–
Thymelaeaceae		×	1	Few
Tiliaceae		×	1–4	–40
Ulmaceae		×	2–3	Few
Urticaceae		×	3–4	10–
Verbenaceae		×	2–6	–20–
Violaceae		×	1–4	–100
Vochysiaceae		×	1–6	–100–

[1] For genera with uniseriate or partly biseriate rays see Table 15.

[2] –20– indicates up to 20 cells or more high; –40– indicates up to 40 or more, etc.

[3] Arrow indicates tendency from the average.

TABLE 15

Woods with Uniseriate or Partly Biseriate* Rays

List originally compiled by Chalk and Chattaway, to which many additions have been made by the author.

Anacardiaceae
- *Anacardium**
- *Mangifera*
- *Mauria*

Anonaceae
- *Trymatococcus*

Apocynaceae
- *Plumeria*
- *Thevetia**
- *Zschokkea**

Bignoniaceae
- *Tabebuia** (*Tecoma*)

Burseraceae
- *Crepidospermum*
- *Protium*

Capparidaceae
- *Capparis** (occ.)
- *Crataeva** (occ.)
- *Steriphoma*

Caryocaraceae
- *Caryocar** (occ.)

Combretaceae
- *Terminalia*

Connaraceae
- *Connarus** (occ.)

Ebenaceae
- *Diospyros*

Erythroxylaceae
- *Erythroxylon** (occ.)

Euphorbiaceae
- *Acalypha**
- *Alchornea*
- *Aparisthmium**
- *Cleidion**
- *Codiaeum*
- *Hura**
- *Jatropha**
- *Mabea*
- *Maprounea**
- *Sapium**

Guttiferae
- *Calophyllum*

Lacistemaceae
- *Lacistema** (occ.)

Lauraceae
- *Phoebe**

Lecythidaceae
- *Lecythis* (occ.)

Leguminosae
- *Acacia* (occ.)
- *Bauhinia**
- *Caesalpinia** (occ.)
- *Cassia**
- *Crudia*
- *Cynometra**
- *Dalbergia**
- *Dialium*
- *Machaerium*
- *Macrolobium*
- *Myroxylon*
- *Pithecolobium*
- *Pterocarpus*

Loganiaceae
- *Strychnos**
- *Potalia**

Lythraceae
- *Lagerstroemia**

Malpighiaceae
- *Spachea**

Melastomaceae
- *Bellucia*
- *Henriettella*
- *Miconia*
- *Mouriria**
- *Ossaea*

Meliaceae
- *Guarea*
- *Trichilia*

Myristicaceae
- *Compsoneura**
- *Dialyanthera*
- *Iryanthera**

Myristicaceae (*Cont.*)
- *Virola**

Myrtaceae
- *Eucalyptus**
- *Psidium* (occ.)

Nyctaginaceae
- *Neea*
- *Torrubia*

Polygonaceae
- *Coccoloba*
- *Triplaris* (occ.)

Rosaceae
- *Chrysobalanus*
- *Hirtella*
- *Licania*
- *Parinarium**

Rubiaceae
- *Murraya*

Sabiaceae
- *Ophiocaryon*

Salicaceae
- *Salix**

Sapindaceae
- *Allophylus*
- *Cupania*
- *Matayba*
- *Talisia**

Sapotaceae
- *Chrysophyllum* (occ.)
- *Lucuma*
- *Manilkara*

Simarubaceae
- *Picramnia**

Solanaceae
- *Cyphomandra**

Thymelaeaceae
- *Schoenobiblus*

Tiliaceae
- *Mollia**

Violaceae
- *Gloeospermum**

TABLE 16

Woods Classified According to Leaf and Xylological Characters

(This table applies to woods in general, not solely to Peruvian species)

Family	Leaves[1]			Rays[2]		Intercellular Canals		Vessel Perforations[3]		Vascular pitting scalariform	Pits vestured	Vessels with spiral thickenings	Fibers with conspicuous bordered pits
	Simple	Compound	Arrangement	Fine	Conspicuously large	Vertical	Radial	Simple	Scalariform				
Acanthaceae	×		O	×				×					
Anacardiaceae	×	×	A–O	×			×	×*				×	
Anonaceae	×		A		×			×				×	
Apocynaceae	×		A–O–V	×			×	×		× (occ.)	×	×	×
Aquifoliaceae	×		A		×				×	×		×	×
Araliaceae	×	×	A–O		×		×	×*		×		×	
Bignoniaceae	×	×	O–A	×				×				×	
Bixaceae	×		A	×				×*					
Bombacaceae	×	×	A		×	×		×					
Boraginaceae	×		A–O–V	×→[4]		×		×				×	
Burseraceae	×	×	A	×			×	×					
Capparidaceae	×	×	A	×				×			×	×	
Caryocaraceae		×	O–A	×				×*					
Chloranthaceae	×		O		×				×	×			
Cochlospermaceae	×		A	×→				×					
Combretaceae	×		A–O	×		×		×			×		
Compositae	×	×*	A–O–V	×→				×				×	
Connaraceae		×	A	×				×				×	
Dichapetalaceae	×		A	×→				×*					
Dilleniaceae	×		A		×				×*				×
Ebenaceae	×		A	×				×					
Elaeocarpaceae	×		A	×→		×		×*				×	
Erythroxylaceae	×		A	×				×*					
Euphorbiaceae	×	×	A–O–V	×			×	×*		× (occ.)	×	×	× (few)
Flacourtiaceae	×		A	×	×			×*		× (occ.)		×	

[1] O= opposite; A= alternate; V= verticillate. [2] On cross section. [3] * indicates tendency from the prevalent. [4] Arrow indicates tendency from average.

TABLE 16 (*continued*)

WOODS CLASSIFIED ACCORDING TO LEAF AND XYLOLOGICAL CHARACTERS

(*This table applies to woods in general, not solely to Peruvian species*)

FAMILY	LEAVES[1]			RAYS[2]		INTERCELLULAR CANALS		VESSEL PERFORATIONS[3]		Vascular pitting scalariform	Pits vestured	Vessels with spiral thickenings	Fibers with conspicuous bordered pits
	Simple	Compound	Arrangement	Fine	Conspicuously large	Vertical	Radial	Simple	Scalariform				
Gesneriaceae	×		A–O–V	×				×					
Guttiferae	×		O–V	×	×		×	×					
Hypericaceae	×		O–V	×				×					
Icacinaceae	×		A	×	×				×*				×
Juglandaceae		×	A	×→[4]				×*				×	
Lacistemaceae	×		A	×					×				
Lauraceae	×		A	×→				×*					
Lecythidaceae	×		A		×	×		×					
Leguminosae		←×	A	×	×	×		×			×	×	
Loganiaceae	×		O–V	×	×		×	×*			×	×	
Lythraceae	×		O–A–V	×				×			×		
Malpighiaceae	×		A–O	×				×			×		
Malvaceae	×		A	×	×	×		×				×	
Marcgraviaceae	×		A		×			×*					
Melastomaceae	×		O–V	×				×			×		
Meliaceae		×	A–O	×		×		×				×	
Menispermaceae	×		A	×	×			×					
Monimiaceae	×		O	×	×				×*	×		×	× (few)
Moraceae	×		A	×→				×				×	
Myristicaceae	×		A	×→					×*	×			
Myrsinaceae	×		A		×			×*				×	
Myrtaceae	×		O–A	×		×	×	×			×		
Nyctaginaceae	×		O–A	×				×*					
Ochnaceae	×	×	A	×	×			×*			×		×
Olacaceae	×		A	×				×*					×

[1] O = opposite; A = alternate; V = verticillate. [2] On cross section. [3] * indicates tendency from the prevalent. [4] Arrow indicates tendency from average.

TABLE 16 (*concluded*)

WOODS CLASSIFIED ACCORDING TO LEAF AND XYLOLOGICAL CHARACTERS

(*This table applies to woods in general, not solely to Peruvian species*)

FAMILY	LEAVES[1]			RAYS[2]		INTERCELLULAR CANALS		VESSEL PERFORATIONS[2]		Vascular pitting scalariform	Pits vestured	Vessels with spiral thickenings	Fibers with conspicuous bordered pits
	Simple	Compound	Arrangement	Fine	Conspicuously large	Vertical	Radial	Simple	Scalariform				
Onagraceae	×		A–O	×				×*			×		
Piperaceae	×		A–O–V		×			×*					
Polygonaceae	×		A–O–V	×				×			×	×	
Proteaceae	×		A		×	×		×				×	
Rhamnaceae	×		A–O	×				×				×	
Rosaceae	×	×	A–O	×				×*				×	×
Rubiaceae	×		O–V	×				×*			×	×	
Rutaceae	×	×	A–O	×		×		×*				×	
Sabiaceae	×	×	A	×	×				×				
Salicaceae	×		A	×				×					
Sapindaceae		←×[4]	A–O	×		×		×				×	
Sapotaceae	×		A	×				×*					
Simarubaceae		←×	A–O		×	×		×				×	
Solanaceae	×	×	A	×	×		×	×				×	
Staphyleaceae		×	O	×	×				×*				×
Sterculiaceae	×→	×	A–O		×	×		×				×	
Theaceae	×		A	×→					×*			×	×
Theophrastaceae	×		A–O–V		×			×					
Thymelaeaceae	×		A–O		←×		×	×			×	×	
Tiliaceae	×		A–O	×→				×				×	
Ulmaceae	×		A	×				×*				×	
Urticaceae	×		A–O	×→				×				×	
Verbenaceae	×	×	O–V	×→				×*				×	
Violaceae	×		A	×	×				×*	×			
Vochysiaceae	×		A–O		×	×		×			×		

[1] O=opposite; A=alternate; V=verticillate. [2] On cross section. [3] * indicates tendency from the prevalent. [4] Arrow indicates tendency from average.

VERNACULAR NAMES

Though the official language of Peru is Spanish, the use of Quechua, the ancient language of the Incas, is still retained by the inhabitants of the sierras as well as by the Spanish-speaking people of the montaña.

The Incas were familiar with the properties and economic uses of many plants, consequently their botanical vocabulary was remarkably large. As they did not have an alphabet or any mode of writing, existing Quechua vocabularies, first written phonetically by Jesuit missionaries, exhibit great variation in spelling.

It may be of interest to include here the English equivalent of some Quechua terms that are used in connection with the montaña or recur with frequency in the succeeding list of plant names.

allpa or *ashpa*, earth
caspi, tree or wood
chiri, cold
cocha, lake
huasca, vine or liane
huayo, fruit
parca, double
paccha, cataract or rapids
pongo, channel or narrow entrance
puca, red
quillo, yellow
quiro, tooth
rumi, stone
sacha, forest
sara, Indian corn
sisa, flower
uma, head
ucsha, grass
urcu, hill or ridge
yaco, river or water
yana, black
yunga, worm
yurac, white
yuras, herb

Since the conquest of Peru, many Spanish plant names have been introduced and are widely used. The common use of both Spanish and Quechua has given rise to many hybrid designations, as the Quechua–Spanish "sacha-límon" or the Spanish–Quechua "remo-caspi." In addition, the Indian tribes along the Ucayali, Marañón, and Napo rivers and their tributaries possess distinctive dialects.

The local names listed are those in use in northeastern Peru and include many terms applied to herbs and shrubs collected but not described in the present publication. In the absence of a standard orthography, except for the Spanish, the spelling of the vernacular names represents the author's transcription of the spoken words.

The abbreviations in parentheses indicate the probable derivation; thus:

(A)=Aztec; (C)=Cocama; (I)=Iquitos; (LG)=Lingua Geral; (Q)=Quechua; (S)=Spanish; and (Y)=Yahua. Where there is no indication it may be assumed that the word is of Spanish origin.

Common Name	Scientific Name	Family
Abre-mano	*Bauhinia* sp.	Leguminosae
Achcu-ysman (Q)	*Gilibertia Williamsii* Harms	Meliaceae
Achiote (A)	*Bixa Orellana* L.	Bixaceae
" blanco (A–S)	*Bixa Orellana* L.	Bixaceae
" colorado (A–S)	*Bixa Orellana* L.	Bixaceae
Achira (Q)	*Canna* sp.	Cannaceae
" amarilla (Q–S)	*Canna* sp.	Cannaceae
" colorada (Q–S)	*Canna* sp.	Cannaceae
Achuni-caspi (Q)	*Rheedia* sp.	Guttiferae
Achupa (Q)	*Aechmea angustifolia* P. & E.	Bromeliaceae
Afasiquihua (Q)	*Peperomia paucispica* Trel.	Piperaceae
Afas-quiro (Q)	*Pharus glaber* HBK.	Gramineae
Agrio	*Costus spiralis* (Jacq.) Rose.	Zingiberaceae
Agua-moena (S–Q)	*Endlicheria anomala* Nees	Lauraceae
Aguano	*Swietenia macrophylla* King	Meliaceae
Airambo (Q)	*Phytolacca rivinoides* K. & B.	Phytolaccaceae
Airana (Q)	*Maprounea guianensis* Aubl.	Euphorbiaceae
Ají	*Roupala* sp.	Proteaceae
"	*Solanum* sp.	Solanaceae
" de solan	*Capsicum annuum* L.	Solanaceae
" " "	*Capsicum baccatum* L.	Solanaceae
" quintillo	*Capsicum frutescens* L.	Solanaceae
Ajuela	*Spondias purpurea* L.	Anacardiaceae
Albahaca	*Ocimum micranthum* Willd.	Labiatae
Alcanfor sacha (S–Q)	*Zanthoxylum* sp.	Rutaceae
Alegría	*Nothopanax fruticosum* (L.) Merr.	Araliaceae
Alejandrina	*Rosa indica* L.	Rosaceae
Alfalfa	*Trichachne insularis* (L.) Nees	Gramineae
Algarrobo	*Pithecolobium Mathewsi* Benth.	Leguminosae
Algodón	*Gossypium barbadense* L.	Malvaceae
"	*Gossypium barbadense* L., var. *peruvianum* Cav.	Malvaceae
Allcu-ishanga (Q)	*Urera laciniata* Wedd.	Urticaceae
Almendrillo	*Cordia nodosa* Lam.	Boraginaceae
Almendro	*Caryocar coccineum* Pilger	Caryocaraceae
"	*Caryocar Tessmannii* Pilger	Caryocaraceae
"	*Terminalia Catappa* L.	Combretaceae
" de bajo	*Caryocar glabrum* Pers.	Caryocaraceae
Amanarapi (Q)	*Cissus* sp.	Vitaceae
Amanga (Q)	*Eucharis grandiflora* Planch. & Linden	Amaryllidaceae
" "	*Rudgea retifolia* Standl.	Rubiaceae
Amaquillo (Q)	*Mabea subsessilis* Pax & Hoffm.	Euphorbiaceae
Amargo	*Ambrosia peruviana* Willd.	Compositae
Amargo-caspi (S–Q)	*Cassia chrysocarpa* Desv.	Leguminosae
Amarosoes	*Desmodium adscendens* DC.	Leguminosae
Amasisa (Q)	*Erythrina esculenta* Sprague	Leguminosae
" "	*Erythrina glauca* Willd.	Leguminosae
" "	*Erythrina Ulei* Harms	Leguminosae
Amchiponga (Q)	*Jacaranda filicifolia* D. Don(?)	Bignoniaceae
Amor enredado	*Antigonon leptopus* Hook. & Arn.	Polygonaceae
Amorfina	*Lawsonia inermis* L.	Lythraceae
" colorada	*Lawsonia inermis* L.	Lythraceae
Amor seco	*Desmodium adscendens* (Sw.) DC.	Leguminosae

Common Name	Scientific Name	Family
Amor seco	*Desmodium axillare* (Sw.) DC.	Leguminosae
" "	*Oxalis* sp.	Oxalidaceae
Ampato-huasca (Q)	*Anguria triphylla* Miq.	Cucurbitaceae
" " "	*Cayaponia tomentosa* Cogn.	Cucurbitaceae
" " "	*Cissus sicyoides* L.	Vitaceae
" " "	*Cissus* spp.	Vitaceae
Ana (Q)	*Erythrina* sp.	Leguminosae
Añallio-caspi (S–Q)	*Cordia nodosa* Lam.	Boraginaceae
" " "	*Mendoncia Lindavii* Rusby	Acanthaceae
Ancu-sacha (Q)	*Sida rhombifolia* L.	Malvaceae
Andara-caspi (S–Q)	*Sanchezia Williamsii* Leonard	Acanthaceae
Andiroba	*Carapa*, aff. *guianensis* Aubl.	Meliaceae
Angel-sisa (S–Q)	*Caesalpinia pulcherrima* (L.) Sw.	Leguminosae
Anil	*Indigofera suffruticosa* Mill.	Leguminosae
Aninshipircuio (Q)	*Pariana zingiberina* Doell	Gramineae
Anis	*Foeniculum vulgare* Mill.	Umbelliferae
Anona	*Duguetia Spixiana* Mart.	Anonaceae
"	*Rollinia* sp.	Anonaceae
"	*Xylopia* sp.	Anonaceae
Anonilla	*Anona scandens* Diels	Anonaceae
"	*Tetrathylacium macrophyllum* Poepp. & Endl.	Flacourtiaceae
Apacas (Q)	*Phytolacca rivinoides* Kunth & Bouché	Phytolaccaceae
Apacharana (Q)	*Moquilea tomentosa* Benth.	Rosaceae
Apalo	*Solanum* sp.	Solanaceae
Arbol de navidad	*Phyllanthus* sp.	Euphorbiaceae
Arbol del pan	*Artocarpus communis* Forst.	Moraceae
Arean (Q)	*Maprounea guianensis* Aubl.	Euphorbiaceae
Aripari (Q)	*Macrolobium taxifolium* Spruce	Leguminosae
Aristas-poroto	*Phaseolus lunatus* L.	Leguminosae
Arnica	*Cosmos caudatus* HBK.	Compositae
Arroz	*Oryza sativa* L.	Gramineae
Arroz-quina (S–Q)	*Anthephora hermaphrodita* (L.) Kuntze	Gramineae
Asar-quiro (Q)	*Isertia alba* Sprague	Rubiaceae
" " "	*Hedyosmum racemosum* (R. & P.) Don	Chloranthaceae
Asar-sisa (Q)	*Remijia peruviana* Standl.	Rubiaceae
Asnac-panga (Q)	*Phyllanthus* sp.	Euphorbiaceae
Ataca	*Amaranthus gracilis* Desf.	Amaranthaceae
"	*Amaranthus spinosus* L.	Amaranthaceae
" -casha (S–Q)	*Amaranthus spinosus* L.	Amaranthaceae
Atadejo, Atadijo	*Trema micrantha* (L.) Blume	Ulmaceae
Atun-mullaca (Q)	*Miconia nervosa* (Sm.) Triana	Melastomaceae
Atun-rupinia (Q)	*Poraqueiba* sp.(?)	Icacinaceae
Atun-shicshic (Q)	*Scleria stipularis* Nees	Cyperaceae
Avilla	*Sicydium diffusum* Cogn.	Cucurbitaceae
Avocado	*Persea americana* Mill.	Lauraceae
Awa (Y)	*Cephaelis barcellana* (Muell.) Standl.	Rubiaceae
Ayahuasca (Q)	*Banisteria Caapi* Spruce	Malpighiaceae
" "	*Banisteria quitensis* Ndzu.	Malpighiaceae
Aya manchana (Q)	*Lantana Camara* L.	Verbenaceae
" mullaca (Q–S)	*Solanum* sp.	Solanaceae

Common Name	Scientific Name	Family
Aya-murillu (Q)	*Hibiscus Abelmoschus* L.	Malvaceae
" -porotillo (Q–S)	*Cassia occidentalis* L.	Leguminosae
" -poroto (Q–S)	*Cassia occidentalis* L.	Leguminosae
" " "	*Cassia Tora* L.	Leguminosae
" -shimbillo (Q–S)	*Inga* sp.	Leguminosae
" -sisa (Q)	*Tagetes erecta* L.	Compositae
Azúcar-huayo (S–Q)	*Hymenaea palustris* Ducke	Leguminosae
Azul mullaca (S–Q)	*Calyptrella* sp.	Melastomaceae
Bachata	*Gonzalagunia cornifolia* (HBK.) Standl.	Rubiaceae
Bacurí (LG)	*Cordia heterophylla* Roem. & Schult.	Boraginaceae
Balata blanca de altura	*Chrysophyllum Klugii* Baehni	Sapotaceae
Balsa-mullaca (S–Q)	*Physalis angulata* L.	Solanaceae
" " "	*Physalis pudescens* L.	Solanaceae
Baras-casha (Q)	*Desmoncus prunifer* Poepp.	Palmae
Barbasco	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
"	*Tephrosia toxicaria* Pers.	Leguminosae
" -caspi (S–Q)	*Schoenobiblus peruvianus* Standl.	Thymelaeaceae
" legítimo	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
Barbobaca	*Desmodium axillare* (Sw.) DC.	Leguminosae
Barilla	*Sommera sabiceoides* Schum.	Rubiaceae
Batatillo	*Ipomea phillomega* (Vell.) House	Convolvulaceae
Begonia	*Begonia* sp.	Begoniaceae
" rosada	*Begonia* sp.	Begoniaceae
Bejuco-bravo	*Banisteria quitensis* Ndzu.	Malpighiaceae
Bella Angelica	*Rosa indica* L.	Rosaceae
Bellaco-caspi (S–Q)	*Plumeria tarapotensis* Schum.	Apocynaceae
" " "	*Bombax aquaticum* (Aubl.) Schum.	Bombacaceae
Bellaquillo (S–Q)	*Thevetia peruviana* (Pers.) Schum.	Apocynaceae
Bijauillo	*Calathea altissima* (P. & E.) Horan	Marantaceae
"	*Calathea comosa* (L. f.) Lindl.	Marantaceae
"	*Calathea exscapa* (P. & E.) Koern.	Marantaceae
"	*Heliconia brasiliensis* Hook.	Musaceae
"	*Heliconia hirsuta* var. *cannoides* (Rich.) Baker	Musaceae
"	*Heliconia psittacorum* L. f.	Musaceae
"	*Heliconia Schumanniana* Loes.	Musaceae
"	*Monotagma laxum* (P. & E.) Schum.	Marantaceae
"	*Monotagma laxum* var. *oblongifolium* Macbr.	Marantaceae
"	*Myrosma stromanthoides* Macbr.	Marantaceae
Bobensana	*Calliandra angustifolia* Spruce	Leguminosae
Boca de león	*Angelonia* sp.	Scrophulariaceae
Bolaina	*Guazuma crinita* Mart.	Sterculiaceae
Bola-quiro (S–Q)	*Astronium* sp.	Anacardiaceae
" " "	*Schinopsis peruviana* Engl.	Anacardiaceae
Bolina	*Muntingia Calabura* L.	Elaeocarpaceae
Bombonaje	*Carludovica palmata* Ruiz & Pavón	Cyclanthaceae

Common Name	Scientific Name	Family
Bonita	*Chamaedorea lanceolata* (R. & P.) Kunth	Palmae
Borracho-sisa (S–Q)	*Banara mollis* Tul.	Flacourtiaceae
" " "	*Psychotria Williamsii* Standl.	Rubiaceae
Bosquesito	*Cuphea speciosa* (Anders.) Ktze.	Lythraceae
Botón artificial	*Aster laevis* L.	Compositae
" -quihua (S–Q)	*Hyptis savannarum* Briq.	Labiatae
" -quino (S–Q)	*Hyptis lantanaefolia* Poit.	Labiatae
" " "	*Hyptis obtusiflora* Presl	Labiatae
" -sula (S–Q)	*Hyptis recurvata* Poit.	Labiatae
" " "	*Spilanthes americana* (Mutis) Hieron	Compositae
Botoncillo	*Spilanthes americana* (Mutis) Hieron	Compositae
"	*Wedelia trilobata* var. *pilosissima* Blake	Compositae
Brasilerina	*Caladium Humboldtii* Schott	Araceae
"	*Codiaeum variegatum* Blume	Euphorbiaceae
Brea-caspi (S–Q)	*Rheedia* sp.	Guttiferae
" " "	*Symphonia globulifera* L. f.	Guttiferae
" -huayo (S–Q)	*Cordia* sp.	Boraginaceae
" " "	*Rheedia floribunda* (Miq.) Tr. & Pl.	Guttiferae
Brinco de dama	*Clerodendron Thomsonae* Balf.	Verbenaceae
" " "	*Lonicera* sp.	Caprifoliaceae
Bronce	*Alocasia indica* (Roxb.) Schott, var. *metallica* Schott	Araceae
Bucacuru-caspi (Q)	*Miconia longiracemosa* Gleason	Melastomaceae
" " "	*Miconia pteropoda* Benth.	Melastomaceae
Bujeo	*Zebrina pendula* Schnizl.	Commelinaceae
Buquet de novia	*Ixora coccinea* L.	Rubiaceae
" " "	*Ixora Finlaysoniana* Wall.	Rubiaceae
" " " rosado	*Ixora chinensis* Lam.	Rubiaceae
Caápi (Q)	*Banisteria Caapi* Spruce	Malpighiaceae
Caballo-usa (S–Q)	*Pithecolobium* sp.	Leguminosae
" " "	*Sida cordifolia* L.	Malvaceae
" " "	*Triumfetta althaeoides* Lam.	Tiliaceae
" " "	*Triumfetta semitriloba* L.	Tiliaceae
Cacahuillo	*Theobroma Mariae* (Mart.) Schum.	Sterculiaceae
"	*Theobroma subincana* Mart.	Sterculiaceae
Cacao	*Theobroma Cacao* L.	Sterculiaceae
" -senisa	*Theobroma ferruginea* Bern.	Sterculiaceae
" silvestre	*Theobroma Cacao* L.	Sterculiaceae
Café	*Coffea arabica* L.	Rubiaceae
" mashan (S–Q)	*Monstera falcifolia* Engl.	Rubiaceae
" " "	*Psychotria ligustrina* Willd.(?)	Rubiaceae
Caimitillo	*Abuta concolor* P. & E.	Menispermaceae
Caimito	*Lucuma Caimito* (R. & P.) R. & S.	Sapotaceae
Caju	*Anacardium occidentale* L.	Anacardiaceae
Calavera mullaca (S–Q)	*Psammisia guianensis* Kl.	Ericaceae
Calzoncillo	*Luehea tarapotina* Macbr.	Tiliaceae
" -panga (S–Q)	*Luehea tarapotina* Macbr.	Tiliaceae
Camesito	*Rapanea Sprucei* Mez	Myrsinaceae

Common Name	Scientific Name	Family
Camote	*Ipomoea Batatas* (L.) Lam.	Convolvulaceae
"	*Ipomoea phillomega* (Vell.) House	Convolvulaceae
" -huasca (S–Q)	*Ipomoea squamosa* Choisy	Convolvulaceae
Campanilla	*Hibiscus schizopetalus* Mart.	Malvaceae
"	*Odontadenia grandiflora* (Mey.) Kuntze	Malvaceae
Canastilla	*Aristolochia asperifolia* Ule	Aristolochiaceae
"	*Hibiscus schizopetalus* Mart.	Malvaceae
Canela-moena (S–Q)	*Endlicheria anomala* Nees	Lauraceae
" " "	*Ocotea laxiflora* (Meisn.) Mez	Lauraceae
" " "	*Ocotea tarapotana* (Meisn.) Mez	Lauraceae
Caña de azúcar	*Saccharum officinarum* L.	Gramineae
Caoba	*Swietenia macrophylla* King	Meliaceae
Capinuri	*Clarisia nitida* (Allem.) Macbr.	Moraceae
"	*Ficus* sp.	Moraceae
"	*Rudgea cephalantha* Standl.	Rubiaceae
Capirona	*Calycophyllum Spruceanum* Hook. f.	Rubiaceae
" del bajo	*Cinchona officinalis* L.	Rubiaceae
" negra	*Capirona decorticans* Spruce	Rubiaceae
Capricornia	*Couepia speciosa* Pilger	Rosaceae
Caracana (Q)	*Lindackeria maynensis* Poepp. & Endl.	Flacourtiaceae
Cara-caspi (S–Q)	*Anona* sp.	Anonaceae
" " "	*Unonopsis* sp.	Anonaceae
" -huasca (S–Q)	*Guatteria phanerocampta* Diels	Anonaceae
" " "	*Malmea* sp.	Anonaceae
Caracha-caspi (Q)	*Miconia amplexans* (Crueger) Cogn.	Melastomaceae
" " "	*Miconia dichrophylla* Macbr.	Melastomaceae
" " "	*Miconia juruensis* Pilger	Melastomaceae
" " "	*Miconia serialis* DC.	Melastomaceae
" " "	*Miconia stenostachya* DC.	Melastomaceae
" " "	*Tachigalia paniculata* Aubl.	Leguminosae
Carachupa-sacha (Q)	*Miconia minutiflora* (Bonpl.) DC.	Melastomaceae
Caracucha (Q)	*Plumeria acutifolia* Poir.	Apocynaceae
Carlota	*Rosa indica* L.	Rosaceae
Carmelo	*Borreria latifolia* (Aubl.) Schum.	Rubiaceae
Carnaval-sisa (S–Q)	*Jussiaea nervosa* Poir.	Onagraceae
Carrizo	*Lasiacis ligulata* H. & C.	Gramineae
"	*Lasiacis sorghoidea* (Desv.) H. & C.	Gramineae
"	*Olyra latifolia* L.	Gramineae
"	*Pariana zingiberina* Doell	Gramineae
Cascabel	*Clidemia bullosa* (Spreng.) Cogn.	Melastomaceae
"	*Crotalaria nitens* HBK.	Leguminosae
Cascarilla	*Bonnetia paniculata* Spruce	Theaceae
"	*Remijia peruviana* Standl.	Rubiaceae
" amarilla	*Cinchona officinalis* L.	Rubiaceae
Casha-huasca (Q)	*Cardiospermum Corindum* L.	Sapindaceae
" -huayo (Q)	*Carpotroche parvifolia* Macbr.	Flacourtiaceae
" -mullaca (Q)	*Miconia pileata* DC.	Melastomaceae
" -punga (Q)	*Aechmea angustifolia* P. & E.	Bromeliaceae
Castaña	*Bertholletia* sp.	Lecythidaceae
"	*Terminalia Catappa* L.	Combretaceae

Common Name	Scientific Name	Family
Casu	*Anacardium occidentale* L.	Anacardiaceae
Catahua	*Erythroxylon paraense* Peyr.	Erythroxylaceae
"	*Hura crepitans* L.	Euphorbiaceae
Caucho blanco	*Sapium* sp.	Euphorbiaceae
" -mashan (S–Q)	*Sapium* sp.	Euphorbiaceae
" negro	*Castilla Ulei* Warb.	Moraceae
" -renaco	*Ficus Mathewsii* Miq.	Moraceae
Caupuri	*Virola Weberbaueri* Markg.	Myristicaceae
Cayhua	*Cyclanthera pedata* Schrad.	Cucurbitaceae
Cedro; Cedro blanco	*Cedrela fissilis* Vell.	Meliaceae
" colorado	*Cedrela odorata* L.	Meliaceae
" -pashaco	*Poeppigia procera* Presl	Leguminosae
Cerezo	*Malpighia glabra* L.	Malpighiaceae
Cidraera	*Lippia alba* (Mill.) N. E. Br.	Verbenaceae
Cidro	*Citrus medica* L.	Rutaceae
Ciomba huasca (Q)	*Paullinia solenoptera* Radlk.	Sapindaceae
Ciruelo	*Bunchosia elliptica* Tod.	Malpighiaceae
"	*Spondias Mombin* L.	Anacardiaceae
"	*Spondias purpurea* L.	Anacardiaceae
" de la China	*Bunchosia elliptica* Tod.	Malpighiaceae
Citu-casha (Q)	*Sonchus asper* (L.) Hill.	Compositae
Clavel blanco	*Lochnera rosea* Reichenb.	Apocynaceae
" rosado	*Lochnera rosea* Reichenb.	Apocynaceae
" "	*Dianthus* sp.	Caryophyllaceae
Clavenilla rosado	*Mirabilis Jalapa* L.	Nyctaginaceae
Clavero	*Cosmos caudatus* HBK.	Compositae
Clavo-caspi (S–Q)	*Torrubia myrtifolia* Standl.	Nyctaginaceae
" -huasca (S–Q)	*Mandevilla scabra* (Schomb.) Schum.	Apocynaceae
Coa	*Borreria latifolia* (Aubl.) Schum.	Rubiaceae
Coca	*Erythroxylon Coca* Lam.	Erythroxylaceae
" -sisa (S–Q)	*Securidaca parvifolia* (Spruce) Chod.	Polygalaceae
Cocoloba	*Schinopsis peruviana* Engl.	Anacardiaceae
Cocona	*Solanum* sp.	Solanaceae
Coconilla colorada	*Solanum* sp.	Solanaceae
Cocopano	*Alchornea triplinervia* Muell. Arg. var. *crassifolia* Muell. Arg.	Euphorbiaceae
Coliflor	*Brassica campestris* L.	Cruciferae
Collar-sisa (S–Q)	*Remijia peruviana* Standl.	Rubiaceae
Comagre colorada	*Costus erythrothyrsus* Loes.	Zingiberaceae
Coñapi	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
Congo-caspi (Q)	*Mayna echinata* Spruce	Flacourtiaceae
Copaiba	*Copaifera reticulata* Ducke	Leguminosae
Copal-caspi (S–Q)	*Protium Carana* March.	Burseraceae
" " "	*Protium crassifolium* (Rich.) Engl.(?)	Burseraceae
" " "	*Protium puncticulatum* Macbr.	Burseraceae
Coral-sisa (S–Q)	*Rourea camptoneura* Radlk.	Connaraceae
Cordoncillo	*Piper achromatolepis* Trel.	Piperaceae
"	*Piper arrectispicum* Trel.	Piperaceae
"	*Piper caballo-cochanum* Trel.	Piperaceae
"	*Piper cumbasanum* Trel.	Piperaceae
"	*Piper excultum* Trel.	Piperaceae
"	*Piper expolitum* Trel.	Piperaceae

Common Name	Scientific Name	Family
Cordoncillo	*Piper falcatum* Trel.	Piperaceae
"	*Piper fortalezanum* Trel.	Piperaceae
"	*Piper granuligerum* Trel.	Piperaceae
"	*Piper granulosum* Ruiz & Pavón	Piperaceae
"	*Piper intosum* Trel.	Piperaceae
"	*Piper iquitosense* Trel.	Piperaceae
"	*Piper lamasense* Trel.	Piperaceae
"	*Piper Lehmannianum* (Miq.) C. DC.	Piperaceae
"	*Piper leucophaeum* Trel.	Piperaceae
"	*Piper lineatum* Ruiz & Pavón	Piperaceae
"	*Piper margaritatum* Trel.	Piperaceae
"	*Piper martinense* Trel.	Piperaceae
"	*Piper nanayanum* Trel.	Piperaceae
"	*Piper occultum* Trel.	Piperaceae
"	*Piper oculatispicum* Trel.	Piperaceae
"	*Piper pebasense* Trel.	Piperaceae
"	*Piper pervulgatum* Trel.	Piperaceae
"	*Piper pothophyllum* Trel.	Piperaceae
"	*Piper reductipes* Trel.	Piperaceae
"	*Piper riojanum* Trel.	Piperaceae
"	*Piper san-roqueanum* Trel.	Piperaceae
"	*Piper Sellertianum* Trel.	Piperaceae
"	*Piper sericeonervosum* Trel.	Piperaceae
"	*Piper Stuebelii* Trel.	Piperaceae
"	*Piper subsessile* Trel.	Piperaceae
"	*Piper tenebricosum* Trel.	Piperaceae
"	*Piper yurimaguasanum* Trel.	Piperaceae
Cornesuelo	*Cassia Ruiziana* Vog.(?)	Leguminosae
Coronilla-sacha (S–Q)	*Achyrocline satureioides* (Lam.) DC.	Compositae
Cortadera	*Scleria bracteata* Cav.	Cyperaceae
"	*Scleria Macbrideana* Gross	Cyperaceae
"	*Scleria Martii* Steud.	Cyperaceae
"	*Scleria melaleuca* S. & C.	Cyperaceae
"	*Scleria microcarpa* Nees	Cyperaceae
"	*Scleria reflexa* HBK.	Cyperaceae
"	*Scleria secans* (L.) Urban	Cyperaceae
"	*Scleria sylvestris* Poepp. & Kunth	Cyperaceae
"	*Scleria vaginata* Steud.	Cyperaceae
Coto-chupa (Q)	*Inga plumifera* Spruce	Leguminosae
Cresta de gallo	*Celosia argentea* L.	Amaranthaceae
Crisántemo	*Chrysanthemum indicum* L.	Compositae
Cruz-chillca	*Meriania Spruceana* Cogn.	Melastomaceae
Cube (Q)	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
" -barbasco (Q–S)	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
Cuburuchi	*Solanum* sp.	Solanaceae
Cucarda	*Hibiscus Rosa-sinensis* L.	Malvaceae
Cuchara-caspi (S–Q)	*Psychotria capitata* R. & P.	Rubiaceae
" " "	*Malouetia furfuracea* Spruce	Apocynaceae
" " "	*Malouetia furfuracea* var. *grandifolia* Muell. Arg.	Apocynaceae
" " "	*Malouetia Tamaquarina* (Aubl.) A. DC.	Apocynaceae
" " "	*Trophis racemosa* (L.) Urban	Moraceae

Common Name	Scientific Name	Family
Cuchi-yuyu (Q–C)	*Boerhaavia coccinea* Mill.	Nyctaginaceae
" " "	*Talinum paniculatum* (Jacq.) Gaertn.	Portulacaceae
Culantro	*Coriandrum sativum* L.	Umbelliferae
"	*Eryngium foetidum* L.	Umbelliferae
Cumala (Q)	*Iryanthera paraensis* Huber	Myristicaceae
"	*Iryanthera Tessmannii* Markg.	Myristicaceae
"	*Neea divaricata* P. & E.	Nyctaginaceae
"	*Theobroma ferruginea* Bern.	Sterculiaceae
"	*Virola cuspidata* (Benth.) Warb.	Myristicaceae
"	*Virola loretensis* A. C. Smith	Myristicaceae
"	*Virola mollissima* (A. DC.) Warb.	Myristicaceae
"	*Virola sebifera* Aubl.	Myristicaceae
" blanca (Q–S)	*Virola calophylla* (Spruce) Warb.	Myristicaceae
" del altura (Q–S)	*Iryanthera juruensis* Warb.(?)	Myristicaceae
" huasca (Q)	*Ipomoea Batatas* (L.) Lam.	Convolvulaceae
" " "	*Ipomoea phillomega* (Vell.) House	Convolvulaceae
Cumba-huasca (Q)	*Paullinia rhizantha* P. & E.	Sapindaceae
Cunchu-caspi (Q)	*Coccoloba peruviana* Lindau	Polygonaceae
Cunshi-cashan (Q)	*Anisomeris paniculata* (Bartl.) Standl.	Rubiaceae
" " "	*Xylosma Salzmannii* Eichl.(?)	Flacourtiaceae
" -huacran (Q)	*Anisomeris paniculata* (Bartl.) Standl.	Rubiaceae
Cunshu-huayo (Q)	*Strychnos Poeppigii* Prog.	Loganiaceae
Cupuassú (LG)	*Theobroma grandiflora* (Willd.) Schum.	Sterculiaceae
Curi-sisa (Q)	*Stigmatophyllon brachiatum* Tr. & Pl.	Malpighiaceae
Curira (C)	*Canna* sp.	Cannaceae
Curuinsi-sacha (Q)	*Siparuna guianensis* Aubl.	Monimiaceae
" " "	*Siparuna thecaphora* (P. & E.) A. DC.	Monimiaceae
Challara corne	*Commelina elegans* HBK.	Commelinaceae
Charachuela (Q)	*Faramea glandulosa* P. & E.	Rubiaceae
" "	*Mouriria grandiflora* DC.	Melastomaceae
Charapa huatana (Q)	*Lunania cuspidata* Warb.	Guttiferae
Charapilla	*Prockia septemnervia* Spreng.	Flacourtiaceae
"	*Capsicum baccatum* L.	Solanaceae
" huatana (Q)	*Pavonia leucantha* Garcke	Malvaceae
Charca-peedia	*Phyllanthus Niruri* L.	Euphorbiaceae
Charichuela (Q)	*Rheedia floribunda* (Miq.) Tr. & Pl.	Guttiferae
" "	*Rheedia macrophylla* (Mart.) Tr. & Pl.	Guttiferae
Chibo-caspi (Q)	*Trichilia flava* C. DC.	Meliaceae
Chibo-runtu-caspi (Q)	*Couepia speciosa* Pilger	Rosaceae
Chichara-caspi (Q)	*Lippia virgata* (R. & P.) Steud.	Verbenaceae
Chiciac panga (Q)	*Pseuderanthemum leptorhachis* Lind.	Acanthaceae
Chici-casha (Q)	*Orophochilus stipulaceus* Lind.	Acanthaceae
Chicitilla sacha (Q)	*Rhynchanthera Hookeri* Naud.	Melastomaceae
Chiclayo	*Echites ovalis* R. & P.	Apocynaceae
"	*Vigna unguiculata* (L.) Walp.	Leguminosae

Common Name	Scientific Name	Family
Chicle	*Macoubea paucifolia* (Spreng.) Mgf.	Apocynaceae
"	*Malouetia Tamaquarina* (Aubl.) A. DC.	Apocynaceae
"	*Zschokkea* sp.	Apocynaceae
Chillca-brava (Q–S)	*Eupatorium amygdalinum* Lam.	Compositae
Chimiqua (Q)	*Ixora Killipii* Standl.	Rubiaceae
" "	*Perebea Chimiqua* Macbr.	Moraceae
" "	*Securinega congesta* Muell. Arg.	Euphorbiaceae
Chino-mashan (S–Q)	*Croton peruvianus* Muell. Arg.	Euphorbiaceae
Chirapa-sacha (Q)	*Aegiphila filipes* Mart. & Schau.	Verbenaceae
" " "	*Aegiphila peruviana* Turcz.	Verbenaceae
" " "	*Psychotria calochlamys* Standl.	Rubiaceae
" " "	*Vernonia scorpioides* Pers.	Compositae
" " "	*Wulffia baccata* (L. f.) Kuntze	Compositae
Chiric-sanango (Q)	*Rauwolfia Duckei* Markgr.	Apocynaceae
Chirimoya	*Anona montana* Macfad.	Anonaceae
"	*Anona muricata* L.	Anonaceae
"	*Anona scandens* Diels, var. *polychyla* Diels	Anonaceae
Choleta-caspi (Q)	*Faramea capillipes* Muell. Arg.	Rubiaceae
Chonchuela (Q)	*Coussarea ovalis* Standl.	Rubiaceae
Chonta-quiro (Q)	*Pithecolobium* sp.	Leguminosae
Chontilla	*Bactris* sp.	Palmae
Chope	*Grias Neuberthii* Macbr.	Lecythidaceae
"	*Gustavia caballoensis* Macbr.	Lecythidaceae
Chuchuhuasha (Q)	*Heisteria pallida* Engl.	Olacaceae
" -mashan (Q)	*Guatteria hyposericea* Diels	Anonaceae
Chupicara (Q)	*Byrsonima* sp.	Malpighiaceae
Dalia	*Dahlia rosea* Cav.	Compositae
"	*Dahlia variabilis* Desf.	Compositae
Diablo-casha (S–Q)	*Xylosma pilosa* Macbr.	Flacourtiaceae
Diamela	*Jasminum Sambac* (L.) Ait.	Oleaceae
Díspero (see Níspero)	*Calyptrella cucullata* (Don) Triana	Melastomaceae
" blanco	*Miconia amazonica* Triana	Melastomaceae
" sacha	*Graffenrieda limbata* Triana	Melastomaceae
" "	*Miconia amazonica* Triana	Melastomaceae
Enredadera	*Antigonon leptopus* HBK.	Polygonaceae
"	*Bougainvillea glabra* Choisy	Nyctaginaceae
"	*Quamoclit pennata* Voigt	Convolvulaceae
"	*Securidaca* sp.	Polygonaceae
Entrada al baile	*Coleus Blumei* Benth.	Labiatae
Entrecasadas	*Euphorbia splendens* Boj.	Euphorbiaceae
Erpes	*Tachigalia paniculata* Aubl.	Leguminosae
Escoba	*Holcus Sorghum* L.	Gramineae
Escobilla	*Combretum Jacquinii* Griseb.	Combretaceae
Espada pichana	*Corchorus pilolobus* Link	Tiliaceae

Common Name	Scientific Name	Family
Espina	*Randia armata* (Sw.) DC.	Rubiaceae
"	*Randia spinosa* (Jacq.) Karst.	Rubiaceae
"	*Zanthoxylum Sprucei* Engl.	Rutaceae
Espintana	*Anaxagorea pachypetala* (Diels) R. E. Fries	Anonaceae
"	*Cymbopetalum Tessmannii* R. E. Fries	Anonaceae
"	*Anaxagorea pallida* Diels	Anonaceae
"	*Malmea cuspidata* Diels	Anonaceae
" blanca	*Duguetia Spixiana* Mart.	Anonaceae
" "	*Marcgravia* sp.	Marcgraviaceae
Espuela-casha (S–Q)	*Casearia spinosa* Willd.	Flacourtiaceae
" " "	*Randia armata* (Sw.) DC.	Rubiaceae
" " "	*Randia spinosa* (Jacq.) Karst.	Rubiaceae
Estoraque	*Myroxylon balsamum* (L.) Harms	Leguminosae
Estrella	*Passiflora quadriglandulosa* Rodsch.	Passifloraceae
"	*Posoqueria longiflora* Aubl.	Rubiaceae
Estrellita	*Hemionitis palmata* L.	Polygonaceae
Eucalipto	*Eucalyptus* sp.	Myrtaceae
Flor del ángel	*Caesalpinia pulcherrima* (L.) Sw.	Leguminosae
" de betún	*Hibiscus Rosa-sinensis* L.	Malvaceae
" de caña	*Cassia chrysocarpa* Desv.	Leguminosae
" de las once	*Portulaca grandiflora* Hook.	Portulacaceae
" " " "	*Portulaca pilosa* L.	Portulacaceae
" de mediodia	*Portulaca* sp.	Portulacaceae
" de muerte	*Asclepias curassavica* L.	Asclepiadaceae
" de paraíso	*Melia Azedarach* L.	Meliaceae
" de pasto	*Sida rhombifolia* L.	Malvaceae
" de piña	*Rhoeo discolor* (L'Hér.) Hance	Commelinaceae
" de sapo	*Isotoma longiflora* (L.) Presl	Lobeliaceae
" de siempreviva	*Gomphrena globosa* L.	Amaranthaceae
" del sol	*Helianthus annuus* L.	Compositae
" de la viuda	*Browallia americana* L.	Solanaceae
" " " "	*Gynandropsis speciosa* (HBK.) DC.	Capparidaceae
" variable	*Hibiscus mutabilis* L.	Malvaceae
Fríjol	*Caesalpinia pulcherrima* (L.) Sw.	Leguminosae
Gallinazo-panga (S–Q)	*Phyllanthus grandifolius* L.	Euphorbiaceae
Gallo-sisa (S–Q)	*Senecio* sp.	Compositae
Game	*Clusia penduliflora* Engler	Guttiferae
"	*Clusia Spruceana* Tr. & Pl.	Guttiferae
Garabato	*Desmoncus spinifer* Poepp.(?)	Palmae
"	*Guettarda ferox* Standl.	Rubiaceae
"	*Uncaria guianensis* Gmel.	Rubiaceae
Garras de gato	*Chomelia unguis-cati* Standl.	Rubiaceae
Ginsira-caspi (S–Q)	*Coussarea tenuiflora* Standl.	Rubiaceae
Goma amarilla	*Vochysia Haenkeana* Mart.	Vochysiaceae
" -huayo (S–Q)	*Sauvagesia erecta* L.	Ochnaceae
Grama-chilluo (S–Q)	*Setaria geniculata* (Lam.) Beauv.	Gramineae

Common Name	Scientific Name	Family
Gramalote	*Echinochloa polystachya* (HBK.) Hitchc.	Gramineae
"	*Hymenachne donacifolia* (Raddi) Chase	Gramineae
"	*Oryza latifolia* Desv.	Gramineae
"	*Paspalum repens* Berg	Gramineae
Granada	*Punica Granatum* L.	Punicaceae
Granadilla	*Gouania trichodonta* Reiss.	Rhamnaceae
"	*Passiflora coccinea* Aubl.	Passifloraceae
"	*Passiflora laurifolia* L.(?)	Passifloraceae
"	*Passiflora nitida* HBK.	Passifloraceae
"	*Passiflora quadrangularis* L.	Passifloraceae
"	*Passiflora quadriglandulosa* Rodsch.	Passifloraceae
"	*Passiflora riparia* Mart.	Passifloraceae
Guanábano	*Anona montana* Macfad.	Anonaceae
"	*Anona muricata* L.	Anonaceae
Guariúba (LG)	*Anona nitida* (Allem.) Macbr.	Moraceae
"	*Clarisia nitida* (Allem.) Macbr.	Moraceae
Guava	*Inga edulis* Mart.	Leguminosae
Guayabo	*Psidium Guajava* L.	Myrtaceae
" del agua	*Psidium* sp.	Myrtaceae
Guayabillo	*Psidium* sp.	Myrtaceae
Gutapercha	*Sapium Hippomane* Mey.	Euphorbiaceae
Herairo	*Bauhinia* sp.	Leguminosae
"	*Cynometra bauhiniaefolia* Benth.(?)	Leguminosae
Higo; Higuera	*Ficus Carica* L.	Moraceae
Higuerilla	*Ricinus communis* L.	Euphorbiaceae
" negra	*Ricinus communis* L.	Euphorbiaceae
Hiruhuaca (Q)	*Faramea* sp.	Rubiaceae
" -caspi (Q)	*Matayba* sp.(?)	Sapindaceae
Hoja del aire	*Bryophyllum pinnatum* (L.) Kurz	Crassulaceae
Hortensia	*Hydrangea opuloides* Koch	Saxifragaceae
Huaca (Q)	*Aegiphila peruviana* Turcz.	Verbenaceae
" "	*Clibadium remotiflorum* Schulz	Compositae
" "	*Clibadium sylvestre* (Aubl.) Baill.	Compositae
Huacamayo (Q)	*Ferdinandusa chlorantha* (Wedd.) Standl.	Rubiaceae
" -caspi (Q)	*Coutarea hexandra* (Jacq.) Schum.	Rubiaceae
" " "	*Sickingia tinctoria* Schum.	Rubiaceae
" -chico (Q–S)	*Pithecolobium Saman Benth.*	Leguminosae
Huacapú (LG)	*Lindackeria maynensis* P. & E.	Flacourtiaceae
" "	*Monstera falcifolia* Engl.	Aracaceae
Huacapurana (LG)	*Campsiandra laurifolia* Benth.	Leguminosae
" "	*Lacistema aggregatum* (Berg) Rusby	Lacistemaceae
Huaca-shambu (Q)	*Vismia* sp.	Hypericaceae
Huachicu (Q)	*Dichorisandra hexandra* (Aubl.) Standl.	Commelinaceae
Huainuna (Q)	*Physocalymma scaberrimum* Pohl	Lythraceae
Huairuru (Q)	*Ormosia coccinea* Jacks.	Leguminosae
Hualaja (Q)	*Zanthoxylum juniperinum* P. & E.	Rutaceae

Common Name	Scientific Name	Family
Huaman-samana (Q)	*Dictyloma peruvianum* Planch.	Rutaceae
Huanábano	*Anona montana* Macfad.	Anonaceae
"	*Anona muricata* L.	Anonaceae
Huangana-caspi (Q)	*Heisteria cauliflora* Sm.	Olacaceae
" " "	*Lucuma huallagae* Standl.	Sapotaceae
Huapa-caspi (Q)	*Macoubea paucifolia* (Spreng.) Mgf.	Apocynaceae
" " "	*Symmeria paniculata* Benth.	Polygonaceae
Huapapa-caspi (Q)	*Heisteria cauliflora* Sm.	Olacaceae
Huapariu (Q)	*Tessaria integrifolia* R. & P.	Compositae
Huaranga (Q)	*Acacia Farnesiana* (L.) Willd.	Leguminosae
Huariúba (LG)	*Clarisia nitida* (Allem.) Macbr.	Moraceae
Huarmi-chuchuhuasha (Q)	*Heisteria pallida* Engler	Olacaceae
" -huarmi (Q)	*Compsoneura capitellata* (Poepp.) Warb.	Myristicaceae
" " "	*Schefflera Ulei* Harms(?)	Araliaceae
Huasca-anona (Q–S)	*Anona scandens* Diels, var. *polychyla* Diels	Anonaceae
" -barbasco (Q)	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
" -game (Q)	*Clusia radicans* R. & P.	Guttiferae
Huayo-chico (Q–S)	*Torenia crustacea* (L.) C. & S.	Scrophulariaceae
Huayhuash-chupa (Q–S)	*Setaria Poiretiana* (Schulz) Kunth	Gramineae
" " "	*Setaria vulpiseta* (Lam.) R. & S.	Gramineae
" -zapote (Q–S)	*Quararibea guianensis* Aubl.	Bombacaceae
Huimba	*Bombax aquaticum* (Aubl.) Schum.	Bombacaceae
"	*Cochlospermum orinocense* (HBK.) Steud.	Cochlospermaceae
Huina-caspi (Q)	*Bombax Munguba* Mart.	Bombacaceae
" " "	*Cochlospermum orinocense* (HBK.) Steud.	Cochlospermaceae
" " "	*Leonia glycycarpa* R. & P.	Cochlospermaceae
Huingo (Q)	*Crescentia Cujete* L.	Bignoniaceae
" -anona (Q–S)	*Anona* sp.	Anonaceae
Huiqui-caspi (Q)	*Zschokkea peruviana* Heurck & Muell.	Apocynaceae
Huira-huayo (Q)	*Carpotroche longifolia* (P. & E.) Benth.	Flacourtiaceae
" -palto (Q–S)	*Persea americana* Mill.	Lauraceae
Huisha (Y)	*Miconia calvescens* (S. & M.) DC.	Melastomaceae
Huitillo (Q)	*Dialium acuminatum* Spruce	Leguminosae
Huito (Q)	*Genipa americana* L.	Rubiaceae
" mullo (Q)	*Henriettella stellaris* Berg	Melastomaceae
Huitoc (Q)	*Ficus anthelminthica* Mart.	Moraceae
" -quiro (Q)	*Ilex* sp.	Aquifoliaceae
Icoja, Icoje (Q)	*Guatteria* sp.	Anonaceae
" " "	*Unonopsis floribunda* Diels(?)	Anonaceae
Icoje (Q)	*Swartzia amplifolia* Harms	Leguminosae
Indano (Q)	*Byrsonima spicata* (Cav.) Rich.	Malpighiaceae
" colorado (Q–S)	*Byrsonima spicata* (Cav.) Rich.	Malpighiaceae
Ingaina (Q)	*Roupala complicata* HBK.	Proteaceae
" blanca (Q–S)	*Mauria suaveolens* P. & E.	Anacardiaceae

Common Name	Scientific Name	Family
Insira (Q)	*Chlorophora tinctoria* (L.) Gaud.	Moraceae
" -caspi (Q)	*Chlorophora tinctoria* (L.) Gaud.	Moraceae
" -mashan (Q)	*Crataeva Tapia* L.	Capparidaceae
Inti-sisa (Q)	*Passiflora setacea* DC.(?)	Passifloraceae
Intuto-caspi (Q)	*Capparis nitida* R. & P.	Capparidaceae
" " "	*Neea subpubescens* Heimerl	Nyctaginaceae
" -huasca (Q)	*Solanum* sp.	Solanaceae
" -moena (Q)	*Aniba* sp.	Lauraceae
Iqui-caspi (Q)	*Zschokkea peruviana* Heurck	Apocynaceae
Isa-paritsi (C)	*Tapirira guianensis* Aubl.	Anacardiaceae
Isangilla (Q)	*Pilea microphylla* (L.) Liebm.	Urticaceae
Ishanga (Q)	*Boehmeria pallida* (Rusby) Killip	Urticaceae
" "	*Fleurya aestuans* (L.) Gaud.	Urticaceae
" "	*Myriocarpa densiflora* Benth.	Urticaceae
" "	*Pilea hyalina* Kuntze	Urticaceae
" "	*Urera baccifera* (L.) Gaud.	Urticaceae
" "	*Urera caracasana* var. *Miquelii* Wedd.	Urticaceae
" "	*Urera laciniata* Wedd.	Urticaceae
" blanca (Q–S)	*Urera caracasana* (Jacq.) Gaud.	Urticaceae
" del agua (Q–S)	*Urera caracasana* (Jacq.) Gaud.	Urticaceae
Ishpingo (Q)	*Jacaranda* sp.	Bignoniaceae
Ishtapi (Q)	*Jacaranda* sp.	Bignoniaceae
Ishunga (Q)	*Fleurya aestuans* (L.) Gaud.	Urticaceae
Isma-moena (Q–C)	*Endlicheria Williamsii* Schmidt	Lauraceae
Isula-caspi (Q)	*Siparuna thecaphora* (P. & E.) A. DC.	Monimiaceae
" -micuna (Q)	*Crepidospermum Goudotianum* Tr. & Pl.	Burseraceae
" " "	*Miconia prasina* (Sw.) DC.	Melastomaceae
" -micunan (Q)	*Siparuna guianensis* Aubl.	Monimiaceae
" " "	*Siparuna plana* Macbr.	Monimiaceae
Itaúba (LG)	*Swartzia pendula* Spruce	Leguminosae
" amarilla (LG–S)	*Pseudolmedia multinervia* Mildbr.	Moraceae
" negra de altura	*Acrodiclidium* sp.	Lauraceae
Itil (Q)	*Mauria suaveolens* P. & E.	Anacardiaceae
" blanco (Q–S)	*Mauria suaveolens* P. & E.	Anacardiaceae
Itininga (Q)	*Monstera falcifolia* Engl.	Aracaceae
Ituchi-caspi (Q)	*Roupala Dielsii* Macbr.	Proteaceae
Itulli-caspi (Q)	*Faramea glandulosa* P. & E.	Rubiaceae
Iumanasa (Q)	*Muntingia Calabura* L.	Elaeocarpaceae
Iumanasi (Q)	*Guazuma ulmifolia* Lam.	Sterculiaceae
Jaboncillo	*Palicourea lasiantha* Krause	Rubiaceae
Jacaré-uba (LG)	*Calophyllum brasiliense* Camb.	Guttiferae
Jagua	*Genipa americana* L.	Rubiaceae
Jazmín	*Gardenia florida* L.	Rubiaceae
"	*Jasminum pubescens* (Retz.) Willd.	Oleaceae
"	*Jasminum Sambac* Ait.	Oleaceae
" de cabo	*Gardenia florida* L.	Rubiaceae

Common Name	Scientific Name	Family
Jebe débil fino	*Hevea brasiliensis* var. *janeirensis* Pax	Euphorbiaceae
" " muerto	*Hevea brasiliensis* (HBK.) Muell. Arg.	Euphorbiaceae
Jenjibre	*Zingiber officinale* Rosc.	Zingiberaceae
Jergon-sacha (S–Q)	*Dracontium loretense* Krause	Aracaceae
" " "	*Urospatha* sp.	Aracaceae
Juapina	*Cupania cinerea* P. & E.	Sapindaceae
Kikinkaka (C)	*Faramea capillipes* Muell.	Rubiaceae
Lagarto-caspi blanco (Q–S)	*Calophyllum brasiliense* Camb.	Guttiferae
Latapi (Q)	*Guarea trichilioides* L.	Meliaceae
" -caspi (Q)	*Guarea trichilioides* L.	Meliaceae
Leche-caspi (S–Q)	*Couma* spp.	Apocynaceae
Lechuza-caspi (S–Q)	*Trichilia peruviana* C. DC.	Meliaceae
Limón agrio	*Citrus aurantifolia* (Christm.) Swingle	Rutaceae
" cidra	*Citrus medica* L.	Rutaceae
" del monte	*Siparuna thecaphora* (P. & E.) A. DC.	Monimiaceae
" dulce	*Citrus Limetta* Risso	Rutaceae
Limulana	*Chlorophora tinctoria* (L.) Gaud.	Moraceae
Locura	*Lagerstroemia indica* L.	Lythraceae
Loro micuna (S–Q)	*Ferdinandusa chlorantha* (Wedd.) Standl.	Rubiaceae
" " "	*Vismia* sp.	Hypericaceae
" micunan (S–Q)	*Pseudolmedia* sp.	Moraceae
" urcu (S–Q)	*Homolepis aturensis* (HBK.) Chase	Gramineae
Lucuma	*Lucuma* sp.	Sapotaceae
Lupina	*Crotalaria retusa* L.	Leguminosae
Lupuna	*Trichilia tocacheana* C. DC.	Meliaceae
Llaja	*Tetrathylacium macrophyllum* P. & E.	Flacourtiaceae
Llajas	*Casearia Poeppigii* Eichl.	Flacourtiaceae
Llama-huasca (Q)	*Clibadium remotiflorum* Schulz	Compositae
Llantai	*Plantago major* L.	Plantaginaceae
Llantén	*Plantago major* L.	Plantaginaceae
Llausa-quiro (Q)	*Heliocarpus popayanensis* HBK.	Tiliaceae
Lluicho-caspi (Q)	*Lindackeria maynensis* P. & E.	Flacourtiaceae
" " "	*Trichilia Riedelii* C. DC.	Meliaceae
" -vainilla (Q–S)	*Guazuma ulmifolia* Lam.	Sterculiaceae
Lluillui-sacha (Q)	*Philodendron* sp.	Aracaceae
Lluvia de oro	*Galphimia gracilis* Benth.	Malpighiaceae
Macambo (Q)	*Theobroma quinquenervia* Bern.	Sterculiaceae
Machacui-bordon (Q–S)	*Dracontium* sp.	Araceae
Machete-vaina	*Bauhinia* spp.	Leguminosae
Machinmangua (Q)	*Banara guianensis* Aubl.	Flacourtiaceae
Machinsacha (Q)	*Psychotria rufescens* H. & B.	Rubiaceae
Machusacha (Q)	*Couepia racemosa* Benth.	Rosaceae
" "	*Sickingia tinctoria* (HBK.) Schum.	Rubiaceae
" mapichi (Q)	*Pera* sp.(?)	Euphorbiaceae
" pichirina (Q)	*Tibouchina ochypetala* (R. & P.) Baill.	Melastomaceae

Common Name	Scientific Name	Family
Macote	*Serjania glabrata* HBK.	Sapindaceae
Macusari (C)	*Solanum* sp.	Solanaceae
Macusaro (C)	*Siparuna thecaphora* (P. & E.) A. DC.	Monimiaceae
Madreselva	*Lonicera japonica* Thunb.	Caprifoliaceae
Maicillo de altura	*Lasiacis ligulata* H. & C.	Gramineae
Maíz	*Zea Mays* L.	Gramineae
" de Guineo	*Holcus Sorghum* L.	Gramineae
Majambo (Q)	*Theobroma quinquenervia* Bern.	Sterculiaceae
Malagueta	*Capsicum frutescens* L.	Solanaceae
Malva	*Malachra alceifolia* Jacq.	Malvaceae
"	*Malachra ruderalis* Guerke	Malvaceae
"	*Triumfetta semitriloba* L.	Tiliaceae
" -masha (S–Q)	*Pavonia paniculata* Cav.	Malvaceae
Manchinga blanca	*Mabea subsessilis* Pax & K. Hoffm.	Euphorbiaceae
Mangarila	*Polianthes tuberosa* L.	Amaryllidaceae
Mango	*Mangifera indica* L.	Anacardiaceae
Mango-micunan (S–Q)	*Capparis petiolaris* HBK.	Capparidaceae
Maní	*Arachis hypogaea* L.	Leguminosae
Mano abierta	*Philodendron* sp.	Aracaceae
" "	*Xanthosoma helleborifolium* Jacq.	Aracaceae
Manzanilla	*Chrysanthemum Parthenium* (L.) Bernh.	Compositae
Maqui-sapa, Maqui-sapa-ñaccha (Q–C)	*Apeiba aspera* Aubl.	Tiliaceae
Maqui-sapa, Maqui-sapa-ñaccha (Q–C)	*Apeiba Tibourbou* Aubl.	Tiliaceae
Maraño (C)	*Tococa juruensis* Pilger	Melastomaceae
Marañón	*Anacardium occidentale* L.	Anacardiaceae
Margarita	*Polianthes tuberosa* L.	Amaryllidaceae
Maricahua (C)	*Datura* sp.	Solanaceae
Mariposa	*Chelonanthus acutangulus* (R. & P.) Gilg	Gentianaceae
Mashishi (Q)	*Cucumis Anguria* L.	Cucurbitaceae
Mashu-huayo (Q)	*Anguria grandiflora* Cogn.	Cucurbitaceae
" -ricrou (Q)	*Solanum* sp.	Solanaceae
" -sacha (Q)	*Couepia racemosa* Benth. var.	Rosaceae
" -shillo (Q)	*Pavonia leucantha* Garcke	Malvaceae
" -sisa (Q)	*Passiflora leptoclada* Harms	Passifloraceae
Mashunasti (Q)	*Anonocarpus amazonicus* Ducke	Moraceae
Matapasto	*Cassia* sp.	Leguminosae
"	*Hyptis mutabilis* (Rich.) Briq.	Labiatae
"	*Hyptis recurvata* Poit.	Labiatae
Mataro (Q)	*Cassia Ruiziana* Vog.(?)	Leguminosae
" "	*Xylopia aromatica* (Lam.) Mart.	Anonaceae
Matayo (Q)	*Cassia viminea* L.	Leguminosae
Mediodía-sacha (S–Q)	*Blakea Spruceana* Cogn.	Melastomaceae
Meradiu (Q)	*Dalbergia inundata* Benth.	Leguminosae
Meralla	*Peperomia pellucida* (L.) HBK.	Piperaceae
Micho-caspi (Q)	*Lippia* sp.(?)	Verbenaceae
Micura (Q)	*Petiveria alliacea* L.	Phytolaccaceae
Miembro viril de la paca	*Hilleria latifolia* (Lam.) H. Walt.	Phytolaccaceae
Millu-caspi (Q)	*Miconia prasina* (Sw.) DC.	Melastomaceae
Millua-caspi (Q)	*Gloeospermum* sp.(?)	Violaceae
" " "	*Miconia macrophylla* (Don) Triana	Melastomaceae

Common Name	Scientific Name	Family
Millua-caspi (Q)	*Passiflora trifasciata* Lam.	Passifloraceae
" -mullaca (Q)	*Clidemia dependens* (Pav.) Don	Melastomaceae
" " "	*Leandra longicoma* Cogn.	Melastomaceae
" " "	*Maieta Poeppigii* Mart.	Melastomaceae
" " "	*Miconia nervosa* (Sm.) Triana	Melastomaceae
" " "	*Miconia pileata* DC.	Melastomaceae
" -shicshic (Q)	*Inga* sp.	Leguminosae
Minchi-pata (C)	*Olmedia aspera* R. & P.	Moraceae
Miniatura	*Rosa indica* L.	Rosaceae
Misho-quiro (Q)	*Alseis peruviana* Standl.	Rubiaceae
" -caspi (Q)	*Picramnia macrostachya* Kl.(?)	Simarubaceae
Mishqui-panga (Q)	*Renealmia macrantha* P. & E.	Zingiberaceae
" " "	*Renealmia Regnelliana* Loes.	Zingiberaceae
" -uchu (Q)	*Capsicum annuum* L.	Solanaceae
" " "	*Capsicum frutescens* L.	Solanaceae
Mito-micunan (Q)	*Psychotria alba* R. & P.	Rubiaceae
Moena (Q)	*Acrodiclidium armeniacum* (Nees) Mez	Lauraceae
" "	*Croton cuneatus* Kl.	Euphorbiaceae
" "	*Endlicheria anomala* Nees	Lauraceae
" "	*Guazuma rosea* P. & E.	Sterculiaceae
" "	*Heisteria cauliflora* Sm.	Olacaceae
" "	*Heisteria cyanocarpa* P. & E.	Olacaceae
" "	*Ocotea maynensis* (Meisn.) Mez	Lauraceae
" "	*Ocotea Tessmannii* Schmidt	Lauraceae
" "	*Ocotea Trianae* Rusby	Lauraceae
" "	*Phoebe maynensis* Nees	Lauraceae
" del agua (Q–S)	*Ajouea Jelskii* Mez	Lauraceae
" " " "	*Endlicheria anomala* Nees	Lauraceae
" aguaras (Q–S)	*Ocotea tarapotana* (Meisn.) Mez	Lauraceae
" amarilla (Q–S)	*Aniba amazonica* (Meisn.) Mez	Lauraceae
" " "	*Aniba Williamsii* Schmidt	Lauraceae
" " "	*Nectandra acutifolia* (P.) Mez	Lauraceae
" " "	*Nectandra globosa* (Aubl.) Mez	Lauraceae
" " "	*Nectandra maranonensis* Schmidt	Lauraceae
" " "	*Nectandra pulverulenta* Nees	Lauraceae
" blanca (Q–S)	*Endlicheria anomala* Nees	Lauraceae
" " "	*Endlicheria Williamsii* Schmidt	Lauraceae
" " "	*Nectandra globosa* (Aubl.) Mez	Lauraceae
" " "	*Nectandra pulverulenta* Nees	Lauraceae
" " "	*Ocotea grandifolia* (Nees) Mez	Lauraceae
" " "	*Ocotea opifera* Mart.	Lauraceae
" " "	*Ocotea rubrinervis* Mez	Lauraceae
" " "	*Ocotea Trianae* Rusby	Lauraceae
" colorada (Q–S)	*Acrodiclidium armeniacum* (Nees) Mez	Lauraceae
" negra (Q–S)	*Ocotea licanioides* A. C. Smith	Lauraceae
Mojarra	*Alchornea triplinervia* Muell. Arg.	Euphorbiaceae
"	*Alchornea triplinervia* var. *crassifolia* Muell. Arg.	Euphorbiaceae
Mojarras-huasca (S–Q)	*Alchornea* sp.	Euphorbiaceae

Common Name	Scientific Name	Family
Montecillo	*Asparagus officinalis* L.	Liliaceae
Monte Cristo	*Gomphrena globosa* L.	Amaranthaceae
Morera	*Solanum* sp.	Solanaceae
Mosqueta	*Rosa indica* L.	Rosaceae
Mostaza	*Brassica juncea* (L.) Coss.	Cruciferae
"	*Rumex crispus* L.	Polygonaceae
Motelo-caspi (Q)	*Erythroxylon Mamacova* Mart.	Erythroxylaceae
" -huasca (Q)	*Securidaca longifolia* P. & E.	Polygonaceae
" -micuna (Q)	*Coussarea tenuiflora* Standl.	Rubiaceae
Mote-mullaca (Q)	*Cordia laurifolia* Killip	Boraginaceae
Mucura (Y)	*Petiveria alliacea* L.	Phytolaccaceae
Muela de gato	*Alseis peruviana* Standl.	Rubiaceae
Muichipata (Q)	*Olmedia aspera* R. & P.	Moraceae
Muina (Y)	*Nectandra Pichurim* (HBK.) Mez	Lauraceae
Mulla de la Virgen	*Coix Lachryma-Jobi* L.	Gramineae
" -huasca (S–Q)	*Tournefortia Schomburgkii* DC.	Boraginaceae
" -huayo (S–Q)	*Tetrathylacium macrophyllum* P. & E.	Flacourtiaceae
" -quillo (S–Q)	*Cordia corymbosa* (L.) Don	Boraginaceae
Mullaca	*Clidemia affinis* (Naud.) Cogn.	Melastomaceae
"	*Clidemia dentata* (Pav.) Don	Melastomaceae
"	*Clidemia dependens* (Pav.) Don	Melastomaceae
"	*Clidemia foliosa* Gleason	Melastomaceae
"	*Clidemia hirta* (L.) Don	Melastomaceae
"	*Clidemia naevula* (Naud.) Triana	Melastomaceae
"	*Clidemia rubra* (Aubl.) Mart.	Melastomaceae
"	*Clidemia septiplinervia* Cogn.	Melastomaceae
"	*Clidemia tiliaefolia* DC.	Melastomaceae
"	*Clidemia Ulei* Pilger	Melastomaceae
"	*Gonzalagunia cornifolia* (HBK.) Standl.	Rubiaceae
"	*Leandra chaetodon* (DC.) Cogn.	Melastomaceae
"	*Leandra dichotoma* (Don) Cogn.	Melastomaceae
"	*Leandra longicoma* Cogn.	Melastomaceae
"	*Leandra secunda* (Don) Cogn.	Melastomaceae
"	*Miconia aurea* Naud.	Melastomaceae
"	*Miconia cannabina* Mgf.	Melastomaceae
"	*Miconia Pilgeriana* Ule	Melastomaceae
"	*Miconia stelligera* Cogn.	Melastomaceae
"	*Ossaea boliviensis* (Cogn.) Gleason	Melastomaceae
"	*Ossaea bullifera* (Pilger) Gleason	Melastomaceae
"	*Physalis angulata* L.	Solanaceae
"	*Psychotria santaremica* Muell. Arg.	Rubiaceae
" del ajo (Q–S)	*Psychotria capitata* R. & P.	Rubiaceae
" azul	*Clidemia naevula* (Naud.) Triana	Melastomaceae
" "	*Salpinga secunda* S. & M.	Melastomaceae
" -caspi (Q)	*Miconia dichrophylla* Macbr.	Melastomaceae
" colorado (Q–S)	*Miconia prasina* (Sw.) DC.	Melastomaceae
" grande (Q–S)	*Bertiera parviflora* Spruce	Rubiaceae
" -huayo (Q)	*Muntingia Calabura* L.	Elaeocarpaceae
Mullo-caspi (Q)	*Neea floribunda* P. & E.	Nyctaginaceae
Municion-uchu (S–Q)	*Capsicum baccatum* L.	Solanaceae
Murcu-huasca (Q)	*Marcgravia Williamsii* Macbr.	Marcgraviaceae
" " "	*Rourea amazonica* Radlk.	Connaraceae

Common Name	Scientific Name	Family
Murcuvarilla colorada (Q–S)	*Erythroxylon lucidum* HBK.	Erythroxylaceae
Muringa (Y)	*Miconia amplexans* (Crueger) Cogn.	Melastomaceae
Murushí (LG)	*Byrsonima fluminensis* Ndzu.	Malpighiaceae
Mushusillo (Q)	*Pavonia leucantha* Garcke	Malvaceae
Nana (Y)	*Endlicheria anomala* Nees	Lauraceae
Naccho-huasca (Y–Q)	*Ogcodeia Tessmannii* Mildbr.	Moraceae
Naranja ácida	*Citrus Aurantium* L.	Rutaceae
Naranjillo	*Casearia spinosa* Willd.	Flacourtiaceae
"	*Murraya exotica* L.	Rutaceae
"	*Nerium Oleander* L.	Apocynaceae
Naranjo	*Citrus Aurantium* L.	Rutaceae
" podrido	*Parahancornia Amapa* (Huber) Ducke	Apocynaceae
Navidad sacha (S–Q)	*Hedychium coronarium* Koen.	Zingiberaceae
Nena (Y)	*Lacistema Nena* Macbr.	Lacistemaceae
Niljilla	*Bactris* sp.	Palmae
Nina-caspi (Q)	*Capparis peliolaris* HBK.	Capparidaceae
" " "	*Crataeva Tapia* L.	Capparidaceae
" " "	*Leonia glycycarpa* R. & P.	Violaceae
" " "	*Mabea* sp.	Euphorbiaceae
" " "	*Swartzia pendula* Spruce	Leguminosae
Níspero (see Díspero)	*Bellucia grossularioides* (L.) Triana	Melastomaceae
" " "	*Bellucia Weberbaueri* Cogn.	Melastomaceae
" " "	*Calyptrella cucullata* (Don) Triana	Melastomaceae
" del monte	*Bellucia grossularioides* (L.) Triana	Melastomaceae
" sacha (S–Q)	*Graffenrieda limbata* Triana	Melastomaceae
" " "	*Miconia amazonica* Triana	Melastomaceae
" " blanco (S–Q)	*Miconia amazonica* Triana	Melastomaceae
Nogal	*Juglans neotropica* Diels	Juglandaceae
Nojarilla	*Mascagnia ovatifolia* (HBK.) Griseb.	Malpighiaceae
Novia-sisa (S–Q)	*Serjania leptocarpa* Radlk.	Sapindaceae
Nowa (Y)	*Swartzia pendula* Spruce	Leguminosae
Nucñu-baras (Q)	*Anacardium* sp.	Anacardiaceae
" " "	*Tapirira* sp.	Anacardiaceae
" -huasca (Q)	*Banisteria elegans* Tr. & Pl.	Malpighiaceae
" -huito (Q)	*Coussarea tenella* Standl.	Rubiaceae
" " "	*Coussarea tenuiflora* Standl.	Rubiaceae
" -mullaca	*Miconia Donaeana* Naud.	Melastomaceae
" -pichana	*Scoparia dulcis* L.	Scrophulariaceae
Nudillo	*Axonopus compressus* (Sw.) Beauv.	Gramineae
"	*Leptochloa filiformis* (Lam.) Beauv.	Gramineae
Nupu-uchu (Q)	*Capsicum baccatum* L.	Solanaceae
Ocuera (C)	*Baccharis oblanceolata* Rusby	Compositae
"	*Vernonia baccharoides* HBK.	Compositae
"	*Vernonia cordifolia* HBK.	Compositae
" común (C–S)	*Vernonia baccharoides* HBK.	Compositae
" negra (C–S)	*Oliganthes Karstenii* Sch. Bip.	Compositae

Common Name	Scientific Name	Family
Oje	*Echites spectabilis* Stdm.	Apocynaceae
"	*Ficus glabrata* HBK.	Moraceae
" de tucunaré (S–LG)	*Casearia timbuchi* Macbr.	Flacourtiaceae
Okuchi-huasi (Q)	*Hasseltia laxiflora* (Benth.) Eichl.	Flacourtiaceae
Ollavaja (Q)	*Lonchocarpus* sp.	Leguminosae
Omechuai-caspi (Q)	*Xylopia aromatica* (Lam.) Mart.	Anonaceae
Orégano	*Lippia alba* (Mill.) N. E. Br.	Verbenaceae
Oreja	*Cosmos caudatus* HBK.	Compositae
" de burro	*Bunchosia elliptica* Tod.	Malpighiaceae
" de perro	*Aristolochia truncata* Field. & Gard.	Aristolochiaceae
" " "	*Caladium bicolor* (Ait.) Vent.	Araceae
Ortiga	*Urera caracasana* (Jacq.) Griseb.	Urticaceae
Osurba (C)	*Couma* sp.	Apocynaceae
Oveja-micuna (S–Q)	*Hyptis mutabilis* (Rich.) Briq.	Labiatae
Pacai (Q)	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
" guava (Q–S)	*Inga edulis* Mart.	Leguminosae
Pacunga	*Bidens cynapiifolia* HBK., var. *portoricensis* (Spreng.) Schultz	Compositae
"	*Bidens pilosa* L.	Compositae
"	*Bidens pilosa* var. *radiata* Sch. Bip.	Compositae
"	*Bidens riparia* HBK.	Compositae
" blanca	*Erechites hieracefolia* (L.) Raf.	Compositae
" negra	*Bidens cynapiifolia* HBK.	Compositae
Paico	*Chenopodium ambrosioides* L.	Chenopodiaceae
Pajar	*Phoradendron piperoides* (HBK.) Trel.	Loranthaceae
" -mullaca	*Clidemia hirta* (L.) D. Don	Melastomaceae
" -umu (S–Q)	*Zschokkea ramosissima* (Spruce) Muell. Arg.	Apocynaceae
" " "	*Zschokkea* sp.	Apocynaceae
Pajarobobo (Q)	*Salix chilensis* Mol.	Salicaceae
" "	*Tessaria integrifolia* R. & P.	Compositae
Palillo	*Selaginella stellata* Spreng.	Selaginellaceae
Palma de mullaca	*Sabicea villosa* R. & S., var. *adpressa* (Wernh.) Standl.	Rubiaceae
Palmiche	*Chamaedorea lanceolata* (R. & P.) Kunth	Palmae
"	*Geonoma* aff. *piscicauda* Dammer	Palmae
" de bajo	*Geonoma paniculata* Mart.	Palmae
Palo blanco	*Alseis peruviana* Standl.	Rubiaceae
" "	*Miconia Pilgeriana* Ule	Melastomaceae
" de balsa	*Ochroma boliviana* Rowlee	Bombacaceae
" de candela	*Crataeva Tapia* L.	Capparidaceae
" de cruz	*Astronium* spp.	Anacardiaceae
" de diablo	*Duroia hirsuta* (P. & E.) Schum.	Rubiaceae
" de paloma	*Alternanthera Bettzickiana* (Regel) Standl.	Amaranthaceae
" de sangre	*Brosimum* spp.	Moraceae
Paloma-chaqui (S–Q)	*Alternantha Bettzickiana* (Regel) Standl.	Amaranthaceae

Common Name	Scientific Name	Family
Palometa-caspi (S–Q)	*Coccoloba Williamsii* Standl.	Polygonaceae
" -huayo (S–Q)	*Lacistema aggregatum* (Berg) Rusby	Lacistemaceae
Palto	*Persea americana* Mill.	Lauraceae
" -shimbillo	*Inga* spp.	Leguminosae
Pamashto	*Aptandra Spruceana* Miers	Olacaceae
"	*Manilkara bidentata* (A. DC.) A. Chev.	Sapotaceae
Pampa-caucho	*Sapium* sp.	Euphorbiaceae
" -huacapurana (S–Q)	*Campsiandra laurifolia* Benth.	Leguminosae
" -moena (S–Q)	*Endlicheria Williamsii* Schmidt	Lauraceae
" " "	*Ocotea Trianae* Rusby	Lauraceae
" -orégano	*Lippia alba* (Mill.) N. E. Br.	Verbenaceae
" " -mashan (S–Q)	*Siparuna Gilgiana* Perk.	Monimiaceae
Pamparemo-caspi (S–Q)	*Duroia longifolia* (P. & E.) Schum.	Rubiaceae
Panguana-mullaca (Q)	*Henriettella stellaris* Berg	Lauraceae
Papayillo	*Guazuma ulmifolia* Lam.	Sterculiaceae
"	*Momordica Charantia* L.	Cucurbitaceae
Papayo	*Carica Papaya* L.	Caricaceae
Papelillo	*Codiaeum variegatum* (L.) Blume	Euphorbiaceae
"	*Tabernaemontana divaricata* (L.) R. Br.	Apocynaceae
Paraíso	*Melia Azedarach* L.	Meliaceae
Parilla	*Sommera sabiceoides* Schum.	Rubiaceae
Parinari (Q)	*Allophylus scrobiculatus* Radlk.	Sapindaceae
" "	*Couepia chrysocalyx* (P. & E.) Benth.	Rosaceae
" "	*Couepia Ulei* Pilger	Rosaceae
" "	*Heisteria densifrons* Engler	Olacaceae
Pashaco (Q)*	*Acacia paniculata* Willd.(?)	Leguminosae
" "	*Acacia polyphylla* DC.	Leguminosae
" "	*Entada polyphylla* Benth.	Leguminosae
" "	*Macrolobium acaciaefolium* Benth.	Leguminosae
" "	*Piptadenia flava* (Spreng.) Benth.	Leguminosae
" "	*Schizolobium excelsum* Vog., var. *amazonicum* Ducke	Leguminosae
" sin espina (Q–S)	*Cassia multijuga* Rich.	Leguminosae
Pasha-mullaca (Q)	*Clidemia dentata* (Pav.) Don	Melastomaceae
Pashaquillo (Q)	*Acacia* sp.	Leguminosae
" "	*Macrolobium acaciaefolium* Benth.	Leguminosae
" "	*Mimosa* sp.	Leguminosae
" "	*Piptadenia flava* (Spreng.) Benth.	Leguminosae
" "	*Pithecolobium Spruceanum* Benth.	Leguminosae
Pati	*Crescentia Cujete* L.	Bignoniaceae
Patquina (C)	*Caladium bicolor* (Ait.) Vent.	Araceae
" "	*Dieffenbachia alba* Lind. & Rod.	Araceae
" "	*Dieffenbachia humilis* Poepp.	Araceae
" "	*Philodendron* sp.	Araceae
" "	*Xanthosma Maffafa* Schott, var. *Poeppigii* (Schott) Engler	Araceae
Paujil-chaqui (S–Q)	*Psychotria viridis* R. & P.	Rubiaceae
" -huasca (Q)	*Dolichocarpus Rolandri* Gmel.	Dilleniaceae
" -mullaca (Q)	*Chrysophyllum* sp.(?)	Sapotaceae

Common Name	Scientific Name	Family
Paujil-ruru (Q)	*Guarea fissicalyx* Harms	Meliaceae
" -sacha (S–Q)	*Connarus Sprucei* Baker	Connaraceae
" -singa (Q)	*Connarus Sprucei* Baker	Connaraceae
Pavoncito	*Caladium Humboldtii* Schott	Araceae
Pegopinto	*Spigelia leiocarpa* Benth.	Loganiaceae
Pepino	*Cucumis sativus* L.	Cucurbitaceae
Pichana albahaca (Q–S)	*Baccharis trinervis* Pers., var. *rhexioides* (HBK.) Baker	Compositae
" blanca (Q–S)	*Ocimum micranthum* Willd.	Labiatae
Pichanillo-huasca (S–Q)	*Mikania loretensis* Robinson	Compositae
Pichi-varilla (Q)	*Xylopia peruviana* Fries	Anonaceae
Pichico	*Rudgea retifolia* Standl.	Rubiaceae
" -caspi (S–Q)	*Clidemia affinis* (Naud.) Cogn.	Melastomaceae
" " "	*Rudgea fimbriata* (Benth.) Standl.	Rubiaceae
Pichirina (Q)	*Capsicum frutescens* L.	Solanaceae
" "	*Miconia amplexans* (Crueg.) Cogn.	Melastomaceae
" "	*Vismia* spp.	Hypericaceae
Picuru-quina (Q)	*Begonia* sp.	Begoniaceae
Picurullu-quina (Q)	*Alternanthera Lehmannii* Hieron.	Amaranthaceae
Piedra con piedra	*Phyllanthus Niruri* L.	Euphorbiaceae
Pimiento	*Capsicum annuum* L.	Solanaceae
"	*Capsicum baccatum* L.	Solanaceae
"	*Capsicum frutescens* L.	Solanaceae
" malaguete	*Capsicum frutescens* L.	Solanaceae
Pina-quiro (Q)	*Lunania cuspidata* Warb.	Flacourtiaceae
Pingacui-sacha (Q)	*Mimosa pudica* L.	Leguminosae
Pingulla-shucush (Q)	*Olyra heliconia* Lindau	Gramineae
Piñón	*Jatropha Curcas* L.	Euphorbiaceae
"	*Jatropha gossypiifolia* L.	Euphorbiaceae
" negro	*Jatropha gossypiifolia* L.	Euphorbiaceae
Pinshi-caspi (Q)	*Aspidosperma subincanum* Mart.	Apocynaceae
Piri-piri (Q)	*Cyperus chalaranthus* Presl	Cyperaceae
" " "	*Cyperus diffusus* Vahl	Cyperaceae
" " "	*Cyperus sphacelatus* Rottb.	Cyperaceae
" " "	*Dichromena amazonica* (P. & K.) Macbr.	Cyperaceae
" " "	*Scleria melaleuca* S. & C.	Cyperaceae
Pishco-huihui (Q)	*Dichorisandra hexandra* (Aubl.) Standl.	Commelinaceae
" -isman (Q)	*Oryctanthus botryostachys* Eichl.	Loranthaceae
" " "	*Phoradendron Mathewsii* Trel.	Loranthaceae
" " "	*Phoradendron quadrangulare* (HBK.) Krug & Urb.	Loranthaceae
" " "	*Phthirusa paniculata* (HBK.) Macbr.	Loranthaceae
" " "	*Phthirusa pyrifolia* var. *terminalis* Macbr.	Loranthaceae
" " "	*Psittacanthus cupulifer* (HBK.) Eichl.	Loranthaceae
" -micuna (Q)	*Oryctanthus glomeratus* (Rich.) Urb.	Loranthaceae
" -moena (Q)	*Phoebe pichisensis* A. C. Smith	Lauraceae
" -ñahui-muina (Y–Q)	*Nectandra Pichurim* (HBK.) Mez	Lauraceae
" -pinguichi (Q)	*Inga* sp.	Leguminosae

Common Name	Scientific Name	Family
Pisho (Q)	*Crudia parivoa* (Rich.) DC.	Leguminosae
Piuca	*Furcraea occidentalis* Trel.	Amaryllidaceae
Platina-caspi (S–Q)	*Heisteria cauliflora* Sm.	Olacaceae
Playa-huasca (S–Q)	*Mikania micrantha* HBK., var. *cynanchifolia* (H. & A.) Rob.	Compositae
Plumaje	*Nephrolepis pectinata* (Willd.) Schott	Polypodiaceae
" de la reina	*Gynandropsis speciosa* (HBK.) DC.	Capparidaceae
Poroto	*Phaseolus lunatus* L.	Leguminosae
Puapua (Q)	*Spirochaeta Funckii* Turcz.	Compositae
Puca-huayo (Q)	*Neea laxa* P. & E.	Nyctaginaceae
" -ishanga (Q)	*Fleurya aestuans* (L.) Gaud.	Urticaceae
" -llaja (Q)	*Erythroxylon paraense* Peyr.	Erythroxylaceae
" -mullaca (Q)	*Clidemia dentata* (Pav.) Don	Melastomaceae
" " "	*Miconia chrysophylla* (Rich.) Urb.	Melastomaceae
" " "	*Salpinga secunda* S. & M.	Melastomaceae
" -quiro (Q)	*Maieta Poeppigii* Mart.	Melastomaceae
" " "	*Sickingia tinctoria* (HBK.) Schum.	Rubiaceae
" " "	*Sickingia Williamsii* Standl.	Rubiaceae
" " -mullaca (Q–S)	*Maieta guianensis* Aubl.	Melastomaceae
" -rupinia (Q)	*Eugenia* sp.(?)	Myrtaceae
" -sisa (Q)	*Warscewiczia coccinea* (Vahl) Kl.	Rubiaceae
" -varilla (Q)	*Adenaria floribunda* HBK.	Lythraceae
" " "	*Stylogyne amplifolia* Macbr.	Myrsinaceae
Pucchucu-pango (Q)	*Costus Puchucupango* Macbr.	Zingiberaceae
Puchcu-mullaca (Q–S)	*Sabicea villosa* R. & S.	Rubiaceae
Pucuna-caspi (C–Q)	*Lucuma bifera* Molina	Sapotaceae
" -uchu (C–Q)	*Capsicum annuum* L.	Solanaceae
Puma-sacha (Q)	*Croton cuneatus* Kl.	Euphorbiaceae
" -sisa (Q)	*Acalypha stricta* P. & E.	Euphorbiaceae
Punga (C)	*Bombax Munguba* Mart. & Zucc.	Bombacaceae
" blanca	*Bombax Munguba* Mart. & Zucc.	Bombacaceae
" " de chamizal (Q–S)	*Bombax paraense* Ducke(?)	Bombacaceae
" -huasca (Q)	*Banisteria Caapi* Spruce	Malpighiaceae
Pungara (Q)	*Cecropia Tessmannii* Mildbr.	Moraceae
Pupa-quihua (Q)	*Sipanea hispida* Benth.	Rubiaceae
Purma-caspi (S–Q)	*Miconia* sp.	Melastomaceae
" " "	*Vernonia baccharoides* HBK.	Compositae
Puru-purillo (Q)	*Passiflora foetida* Vell., var. *baraquiniana* (Lam.) Killip	Passifloraceae
" -puru (Q)	*Passiflora foetida* Vell., var. *baraquiniana* (Lam.) Killip	Passifloraceae
" " "	*Passiflora nitida* HBK.	Passifloraceae
Pushiri (Q)	*Aniba amazonica* (Meisn.) Mez	Lauraceae
Puspu-poroto (Q–S)	*Cajanus bicolor* DC.	Leguminosae
Quillo-bordón (Q–S)	*Aspidosperma subincanum* Mart.	Apocynaceae
" " "	*Casearia* sp.	Flacourtiaceae
" -casha (Q)	*Zanthoxylum Ruizianum* Kl.	Rutaceae
" -moena (Q)	*Aniba amazonica* (Meisn.) Mez	Lauraceae
" -sisa (Q)	*Byrsonima spicata* (Cav.) Rich.	Malpighiaceae
" " "	*Cassia racemosa* Willd.	Leguminosae

Common Name	Scientific Name	Family
Quillo-sisa (Q)	*Cochlospermum orinocense* (HBK.) Steud.	Cochlospermaceae
" " "	*Palicourea macrobotrys* (R. & P.) R. & S.	Rubiaceae
" " "	*Cassia multijuga* Rich.	Leguminosae
Quina (Q)	*Zschokkea* sp.	Apocynaceae
" -quina (Q)	*Capparis Quina* Macbr.	Capparidaceae
" " "	*Cinchona officinalis* L.	Rubiaceae
" " "	*Lucuma dolichophylla* Standl.	Sapotaceae
" " "	*Zschokkea ramosissima* (Spruce) Muell. Arg.	Apocynaceae
Quinilla (Q)	*Bothriospora corymbosa* Hook. f.	Rubiaceae
" "	*Duroia longifolia* (P. & E.) Schum.	Rubiaceae
" "	*Hirtella triandra* Sw.	Rosaceae
" "	*Manilkara bidentata* (A. DC.) A. Chev.	Sapotaceae
" "	*Sideroxylon Ulei* Krause	Sapotaceae
" "	*Warscewiczia coccinea* (Vahl) Kl.	Rubiaceae
" blanca (Q–S)	*Calliandra angustifolia* Spruce	Leguminosae
" " "	*Heisteria cauliflora* Sm.	Olacaceae
" " "	*Lucuma dolichophylla* Standl.	Sapotaceae
" colorada (Q–S)	*Lindackeria maynensis* P. & E.	Flacourtiaceae
" " "	*Manilkara bidentata* (A. DC.) A. Chev.	Sapotaceae
" de tahuampa	*Phyllanthus* sp.	Euphorbiaceae
Racta-panga (Q)	*Curatella americana* L.	Dilleniaceae
Ramía	*Inga* sp.	Leguminosae
Rastrera	*Dicranopteris pectinata* (Willd.) Underw.	Gleicheniaceae
Ratón-caspi (S–Q)	*Hasseltia laxiflora* (Benth.) Eichl.	Flacourtiaceae
Ravesillu	*Lasiacis ligulata* H. & C.	Gramineae
Raya-caspi (S–Q)	*Banara guianensis* Aubl.	Flacourtiaceae
" " "	*Malouetia* sp.	Apocynaceae
" " "	*Pithecolobium laetum* Benth.	Leguminosae
" " "	*Posoqueria longifolia* Aubl.	Rubiaceae
" " "	*Rudgea amazonica* Muell. Arg.(?)	Rubiaceae
" " "	*Tocoyena amazonica* Standl.	Rubiaceae
" " "	*Zanthoxylum* sp.	Rutaceae
Remo-caspi (S–Q)	*Pithecolobium laetum* Benth.	Leguminosae
Renaco	*Clusia insignis* Mart.(?)	Guttiferae
"	*Ficus gemina* Ruiz	Moraceae
"	*Ficus glabrata* HBK.	Moraceae
"	*Ficus Mathewsii* Miq.	Moraceae
"	*Ficus paraensis* Miq.	Moraceae
"	*Ficus Ruiziana* Standl.	Moraceae
"	*Ficus Weberbaueri* Standl.	Moraceae
" -caspi (S–Q)	*Coussapoa grandiceps* Killip	Moraceae
Renaquillo	*Clusia renggerioides* Tr. & Pl.	Guttiferae
"	*Clusia Spruceana* Tr. & Pl.	Guttiferae
"	*Ficus caballina* Standl.	Moraceae
"	*Ficus decussata* R. & P.	Moraceae
"	*Ficus Mathewsii* Miq.	Moraceae
Requía (Q)	*Guarea trichilioides* L.	Meliaceae

Common Name	Scientific Name	Family
Retama	*Cassia marginata* Willd.	Leguminosae
"	*Cassia occidentalis* L.	Leguminosae
"	*Cassia reticulata* Willd.	Leguminosae
"	*Crotalaria nitens* HBK.	Leguminosae
Retamilla	*Cassia leiophylla* Vog.	Leguminosae
"	*Cassia occidentalis* L.	Leguminosae
"	*Cassia viminea* L.	Leguminosae
Rifari (Q)	*Anisomeris paniculata* (Bartl.) Standl.	Rubiaceae
" "	*Miconia longifolia* (Aubl.) DC.	Melastomaceae
" "	*Miconia Poeppigii* Triana	Melastomaceae
" "	*Terminalia oblonga* Steud.	Combretaceae
" "	*Trichilia tocacheana* C. DC.	Meliaceae
Romero	*Rosmarinus officinalis* L.	Labiatae
Rosa	*Rosa indica* L.	Rosaceae
" cana	*Rosa indica* L.	Rosaceae
" de Castilla	*Rosa indica* L.	Rosaceae
" sisa	*Dahlia variabilis* Desf.	Compositae
" "	*Tagetes erecta* L.	Compositae
Rosario	*Tagetes erecta* L.	Compositae
Rosca-shimbillo	*Inga velutina* Willd.	Leguminosae
Rucurana (Q)	*Aparisthmium cordatum* (Juss.) Baill.	Euphorbiaceae
Ruda	*Ruta chalapensis* L.	Rutaceae
Rufindi	*Inga punctata* Willd.	Leguminosae
Ruipato-huasca (Q)	*Cissus sicyoides* L.	Vitaceae
Rumisapa (Q)	*Psychotria alba* R. & P.	Rubiaceae
Rumo-caspi (Q)	*Adenaria floribunda* HBK.	Lythraceae
Rumu-barbasco (Q)	*Lonchocarpus Nicou* (Aubl.) DC.	Leguminosae
Runtu-mullaca (Q)	*Clidemia dentata* (Pav.) Don	Melastomaceae
Rupinia (Q)	*Miconia Poeppigii* Triana	Melastomaceae
Ruturi (Q)	*Heliconia rostrata* R. & P.	Musaceae
" "	*Heliconia Schumanniana* Loes.(?)	Musaceae
Sabino	*Xylopia* sp.(?)	Anonaceae
Sacha-anona (Q–S)	*Anona Tessmannii* Diels	Anonaceae
" -caimito (Q–S)	*Lucuma* sp.	Sapotaceae
" -caspi (Q)	*Duroia hirsuta* (P. & E.) Schum.	Rubiaceae
" -chullcu (Q)	*Peperomia elegantifolia* Trel.	Piperaceae
" " "	*Peperomia non-alata* Trel.	Piperaceae
" -culantro (Q–S)	*Talinum paniculatum* (Jacq.) Gaertn.	Portulacaceae
" -gaito (Q–S)	*Solanum* sp.	Solanaceae
" -guayaba (Q–S)	*Psidium* sp.	Myrtaceae
" -huaca (Q)	*Clibadium remotiflorum* O. E. Schulz	Compositae
" -huiro (Q)	*Dimerocostus Tessmannii* Loes.	Zingiberaceae
" -indana (Q)	*Clusia penduliflora* Engler	Guttiferae
" -limón (Q–S)	*Siparuna thecaphora* (P. & E.) A. DC.	Monimiaceae
" -mancua (Q)	*Sida rhombifolia* L.	Malvaceae
" -manga (Q–S)	*Gustavia* sp.	Lecythidaceae
" -mangua (Q)	*Potalia amara* Aubl.	Loganiaceae
" -mullaca (Q)	*Tococa lasiostyla* Cogn.	Melastomaceae
" -paico (Q)	*Caladium bicolor* (Ait.) Vent.	Araceae

Common Name	Scientific Name	Family
Sacha-papa (Q–S)	*Bidens cynapiifolia* var. *portoricensis* (Spreng.) Schulz	Compositae
" " "	*Cissus* sp.	Vitaceae
" -rumu (Q)	*Manihot* sp.	Euphorbiaceae
" -umarí (Q)	*Couepia chrysocalyx* (P. & E.) Benth.	Rosaceae
" -uva (Q–S)	*Didymopanax Morototoni* (Aubl.) Dcne. & Planch.	Araliaceae
" -uvilla (Q–S)	*Oreopanax Williamsii* Harms	Araliaceae
	Pourouma Ulei Warb.	Moraceae
" -vaca (Q–S)	*Clibadium remotiflorum* Schulz	Compositae
" " -quina (Q–S)	*Anguria triphylla* Miq.	Cucurbitaceae
" -yuchi (Q)	*Plukenetia volubilis* L.	Euphorbiaceae
" -yuchiqui (Q)	*Plukenetia volubilis* L.	Euphorbiaceae
" -yuyu (Q–C)	*Peperomia pellucida* (L.) HBK.	Piperaceae
Salida del baile	*Coleus Blumei* Benth.	Labiatae
Salvaca	*Ocimum micranthum* Willd.	Labiatae
Sanango (Q)	*Tabernaemontana Sananho* R. & P.	Apocynaceae
" "	*Abuta concolor* P. & E.	Menispermaceae
" de bajo (Q–S)	*Rudgea cephalantha* Standl.	Rubiaceae
" sacha (S–Q)	*Petraea* sp.	Verbenaceae
Sananguillo (Q)	*Tabernaemontana Sananho* R. & P.	Apocynaceae
Sandía	*Passiflora aristulata* Mart.(?)	Passifloraceae
Sangapilla	*Cyclanthus bipartitus* Poit.	Cyclanthaceae
Sangre de dragón	*Croton palanostigma* Klotzsch	Euphorbiaceae
Sanipanga	*Picramnia lineata* Macbr.	Simarubaceae
Sanquillo (Q)	*Mikania micrantha* HBK.	Compositae
Santa María	*Piper peltatum* L.	Piperaceae
" mullaca	*Leandra secunda* (Don) Cogn.	Melastomaceae
" Rosa sisa (Q–S)	*Tibouchina ochypetala* (R. & P.) Baill.	Melastomaceae
Sapaelis	*Cucurbita Pepo* L.	Cucurbitaceae
Sapallo	*Cucurbita moschata* Duch.	Cucurbitaceae
Sapechihua (Q)	*Cassia marginata* Willd.	Leguminosae
" "	*Cassia reticulata* Willd.	Leguminosae
Sapo-huasca (S–Q)	*Dalechampia dioscoreifolia* P. & E.	Euphorbiaceae
" " "	*Paullinia caloptera* Radlk.	Sapindaceae
" -maqui (S–Q)	*Selaginella stellata* Spreng.	Selaginellaceae
" -quina	*Coccocypselum hirsutum* Bartl.	Rubiaceae
" -shimbillo	*Inga* sp.	Leguminosae
Sardina mullaca (S–Q)	*Miconia nervosa* (Sm.) Triana	Melastomaceae
Sauce	*Salix chilensis* Mol.	Tiliaceae
Sauco	*Condaminea corymbosa* (R. & P.) DC.	Rubiaceae
"	*Sambucus mexicana* var. *bipinnata* (S. & C.) Schwerin	Caprifoliaceae
Seacun-quihua (Q)	*Kohleria peruviana* Fritsch	Gesneriaceae
Secona	*Sicana odorifera* Naud.	Cucurbitaceae
Selia	*Platymiscium* sp.(?)	Leguminosae
Serpentina	*Nephrolepis rivularis* (Vahl) Mett.	Polypodiaceae
Setico	*Cecropia latifolia* Miq.	Moraceae
"	*Cecropia leucocoma* Miq.	Moraceae
"	*Cecropia obtusa* Trécul	Moraceae
"	*Cecropia sciadophylla* Mart.	Moraceae
" de oyada	*Cecropia Tessmannii* Mildbr.	Moraceae

Common Name	Scientific Name	Family
Shallu-huasca (Q)	*Clibadium remotiflorum* Schulz	Compositae
Shambu (Q)	*Bixa Orellana* L.	Bixaceae
" -huayo (Q)	*Bixa Orellana* L.	Bixaceae
" -quiro (Q)	*Bixa Orellana* L.	Bixaceae
Shamburu (Q)	*Jacaratia digitata* (P. & E.) Solms	Caricaceae
Shamshu-huayo (Q)	*Mayna echinata* Spruce	Flacourtiaceae
Shapillejo	*Zanthoxylum Pterota* HBK.	Rutaceae
"	*Zanthoxylum Ruiziana* Klotzsch	Rutaceae
Shapunba (Q)	*Lycopodium cernuum* L.	Lycopodiaceae
" "	*Pityrogramma calomelaena* (L.) Link	Polypodiaceae
" "	*Selaginella asperula* Spreng.	Selaginellaceae
Shapunbilla (Q)	*Alsophila* sp. or *Cyathea* sp.	Cyatheaceae
" "	*Asplenium flabellatum* Kunze	Polypodiaceae
" "	*Lygodium polymorphum* (Cav.) HBK.	Schizaeaceae
" "	*Pityrogramma calomelaena* (L.) Link	Polypodiaceae
Shapunga (Q)	*Polypodium* sp.	Polypodiaceae
Shara-mashan (Q)	*Ocimum americanum* L.	Labiatae
" " "	*Ocimum minimum* L.	Labiatae
Shatona (Q)	*Trichilia maynasiana* C. DC.	Meliaceae
" blanca	*Guarea* sp.	Meliaceae
" "	*Swartzia myrtifolia* Smith	Leguminosae
" "	*Trichilia sexanthera* C. DC.	Meliaceae
" colorada	*Connarus Patrisii* (DC.) Planch.	Connaraceae
" "	*Erythroxylon Shatona* Macbr.	Erythroxylaceae
Shimbillo	*Allophylus scrobiculatus* Radlk.	Sapindaceae
"	*Inga edulis* Mart.	Leguminosae
"	*Inga graciliflora* Benth.	Leguminosae
"	*Inga ingoides* Willd.	Leguminosae
"	*Inga marginata* Willd.	Leguminosae
"	*Inga pilosiuscula* Desv.(?)	Leguminosae
"	*Inga punctata* Willd.	Leguminosae
"	*Inga quaternata* P. & E.	Leguminosae
"	*Inga Ruiziana* Don	Leguminosae
"	*Inga stenoptera* Benth.	Leguminosae
"	*Inga strigillosa* Benth.	Leguminosae
"	*Pithecolobium laetum* Benth.	Leguminosae
" amargo	*Inga* sp.	Leguminosae
" blanco	*Inga* sp.	Leguminosae
" colorado	*Inga marginata* Willd.	Leguminosae
" paca (S–Q)	*Inga* sp.	Leguminosae
" rujinti (S–Q)	*Inga pilosiuscula* Desv.(?)	Leguminosae
" venenosa	*Inga* sp.	Leguminosae
Shimi-panpana (Q)	*Maranta arundinacea* L.	Marantaceae
Shitari-caspi (Q)	*Allophylus floribundus* Radlk.	Sapindaceae
" " "	*Connarus Patrisii* (DC.) Planch.	Connaraceae
" " "	*Protium* sp.	Burseraceae
" " colorado	*Allophylus floribundus* Radlk.	Sapindaceae
Shuca (Q)	*Vernonia* sp.	Compositae
Shucshu (Q)	*Chusquea* sp.	Gramineae
Shucucu-casha (Q)	*Opuntia brasiliensis* (Willd.) Haw.	Cactaceae
Shucush-quina (Q)	*Panicum polygonatum* Schrad.	Gramineae
Shula (Q)	*Neea divaricata* P. & E.	Nyctaginaceae

Common Name	Scientific Name	Family
Shungu (Q)	*Spondias Mombin* L.	Anacardiaceae
Shushucu (Q)	*Peperomia pellucida* (L.) HBK.	Piperaceae
Shuturi (Q)	*Psychotria calochlamys* Standl.	Rubiaceae
Sichacha (Q)	*Entada polyphylla* Benth.	Leguminosae
Siclaio	*Cassia Tora* L.	Leguminosae
Siempreviva	*Gomphrena globosa* L.	Amaranthaceae
Sillaca	*Pariana campestris* Aubl.	Gramineae
Sinchi (Q)	*Sida cordifolia* L.	Malvaceae
" "	*Sida glomerata* Cav.	Malvaceae
" -caspi (Q)	*Trophis racemosa* (L.) Urban	Moraceae
" -mullaca (Q)	*Leandra chaetodon* (DC.) Cogn.	Melastomaceae
" " "	*Miconia parviflora* (Benth.) Cogn.	Melastomaceae
" -papa (Q–S)	*Dioscorea pinedensis* Kunth	Dioscoreaceae
" -parinari (Q)	*Couepia Ulei* Pilger	Rosaceae
" -pichana (Q)	*Croton chamaedrifolius* Griseb.	Euphorbiaceae
" " "	*Sida rhombifolia* L.	Malvaceae
Siparuna (Q)	*Perebea Chimiqua* Macbr.	Moraceae
Sipra-moena (S–Q)	*Ocotea grandifolia* (Nees) Mez	Lauraceae
Sira-sira (Q)	*Miconia rufescens* (Aubl.) DC.	Melastomaceae
" " "	*Miconia stelligera* Cogn.	Melastomaceae
Siringa; Shiringa	*Hevea brasiliensis* Muell. Arg., var. *janeirensis* Pax	Euphorbiaceae
" "	*Hevea membranacea* Muell. Arg.	Euphorbiaceae
" "	*Hevea microphylla* Ule	Euphorbiaceae
" mapa	*Hevea brasiliensis* (HBK.) Muell. Arg.	Euphorbiaceae
Situlli	*Heliconia brasiliensis* Hook.	Musaceae
"	*Heliconia rostrata* R. & P.	Musaceae
"	*Heliconia variegata* Loes.	Musaceae
Siuca-culantro (Q–S)	*Eryngium foetidum* L.	Umbelliferae
" -huito	*Solanum* sp.	Solanaceae
" -sanango (Q)	*Tabernaemontana Benthamiana* Muell. Arg.	Apocynaceae
" -vito (Q)	*Solanum* sp.	Solanaceae
Siucuc-casha (Q)	*Opuntia brasiliensis* (Willd.) Haw.	Cactaceae
Sonia	*Psychotria nigricans* Standl.	Rubiaceae
Soro-sacha (Q)	*Hyptis mutabilis* (Rich.) Briq.	Labiatae
Suelda con suelda (Epiphytes)	*Phoradendron quadrangulare* Krug & Urb.	Loranthaceae
Sufia	*Cephaelis rosea* Benth.	Rubiaceae
Supai-casha (Q)	*Casearia spinosa* Willd.	Flacourtiaceae
" -caspi (Q)	*Coussarea tenuiflora* Standl.	Rubiaceae
" " "	*Duroia hirsuta* (P. & E.) Schum.	Rubiaceae
" " "	*Xylosma pilosa* Macbr.	Flacourtiaceae
" -ocote (Q–S)	*Allophylus scrobiculatus* Radlk.	Sapindaceae
" -quinilla (Q)	*Duroia hirsuta* (P. & E.) Schum.	Rubiaceae
" -sillo (Q–S)	*Croton* sp.	Euphorbiaceae
Tabaco	*Nicotiana Tabacum* L.	Solanaceae
" del lagarto	*Polygonum portoricense* Bert.	Polygonaceae
Taco	*Luffia acutangula* Roem.	Cucurbitaceae
Tahuampa-caspi (S–Q)	*Cordia tetrandra* Aubl.	Boraginaceae
Tahuari (Q)	*Tabebuia* sp.	Bignoniaceae
" amarilla (Q–S)	*Tabebuia* sp.	Bignoniaceae

Common Name	Scientific Name	Family
Tamamaru	*Hasseltia laxiflora* (Benth.) Eichl.	Flacourtiaceae
Tamamuri	*Ogcodeia Tamamuri* Macbr.	Moraceae
Tamara	*Crataeva Tapia* L.	Capparidaceae
Tambisi	*Dichorisandra hexandra* (Aubl.) Standl.	Commelinaceae
Tambor huactana (S–Q)	*Casearia tarapotina* Pilger	Flacourtiaceae
Tangarana	*Cassia chrysocarpa* Desv.(?)	Leguminosae
"	*Symmeria paniculata* Benth.	Polygonaceae
"	*Triplaris Pavonii* Meisn.	Polygonaceae
"	*Triplaris Poeppigiana* Wedd.	Polygonaceae
" blanca	*Triplaris peruviana* F. & M.	Polygonaceae
" mashan (S–Q)	*Coccoloba Williamsii* Standl.	Polygonaceae
" negra	*Triplaris* sp.	Polygonaceae
Tangerina	*Citrus nobilis* Lour., var. *deliciosa* (Ten.) Swingle	Rutaceae
Taperibá (LG)	*Spondias Mombin* L.	Anacardiaceae
Tapitán	*Heteropteris grandiflora* A. Juss., var. *glandulifera* Ndzu.	Malpighiaceae
Tarrico-nana (Q–C)	*Sideroxylon Williamsii* Baehni	Sapotaceae
Tasha (Q)	*Caladium bicolor* (Ait.) Vent.	Araceae
Té de la China	*Capraria biflora* L.	Scrophulariaceae
Timarehua (C)	*Laetia suaveolens* Benth.	Flacourtiaceae
Tinta mullaca	*Clidemia naevula* (Naud.) Triana	Melastomaceae
Tipu (C)	*Croton chamaedrifolius* Griseb.	Euphorbiaceae
Tirana barbasco (C–Q)	*Tephrosia toxicaria* (L.) Pers.	Leguminosae
Tituna-sacha (Q)	*Solanum* sp.	Solanaceae
Toé (Q)	*Cornutia odorata* (P. & E.) Poepp.	Verbenaceae
" "	*Datura* sp.	Solanaceae
" mullaca	*Solanum bicolor* Willd.	Solanaceae
Tomate	*Lycopersicon esculentum* Mill.	Solanaceae
Topa	*Ochroma boliviana* Rowlee	Bombacaceae
Topamaka blanca	*Neea Spruceana* Heimerl	Nyctaginaceae
Topomaki (Q)	*Psychotria Mathewsii* Standl.	Rubiaceae
" "	*Sanchezia rubriflora* Leonard(?)	Acanthaceae
Tornecillo	*Helicteres pentandra* L.	Sterculiaceae
Toro-urcu (Q)	*Panicum pilosum* Sw.	Gramineae
Tortuga-caspi (S–Q)	*Casearia parvifolia* Willd.	Flacourtiaceae
" " "	*Duguetia quitarensis* Benth.	Anonaceae
" " "	*Guatteria microcarpa* R. & P.	Anonaceae
Torurco (Q)	*Paspalum conjugatum* Berg	Gramineae
Trompetero	*Pfaffia stenophylla* (Spreng.) Standl.	Amaranthaceae
" -caspi (S–Q)	*Crepidospermum Goudotianum* Tr. & Pl.	Burseraceae
" " "	*Psychotria chlorotica* Muell. Arg.	Rubiaceae
" -sacha "	*Clavija* sp.	Theophrastaceae
" -sanango	*Abuta concolor* P. & E.	Menispermaceae
Trompo-huayo (S–Q)	*Aptandra Spruceana* Miers	Olacaceae
" " "	*Lacistema aggregatum* (Berg) Rusby	Lacistemaceae
Trujillo	*Impatiens Balsamina* L.	Balsaminaceae
" blanco	*Impatiens Balsamina* L.	Balsaminaceae
" colorado	*Impatiens Balsamina* L.	Balsaminaceae
" relleno	*Impatiens Balsamina* L.	Balsaminaceae
Tuhuara (C)	*Chimarrhis Williamsii* Standl.	Rubiaceae
Tumbo	*Passiflora quadrangularis* L.	Passifloraceae

Common Name	Scientific Name	Family
Tuno (Q)	*Monstera dilacerata* Koch	Araceae
Turpentina moena (S–Q)	*Ocotea tarapotana* (Meisn.) Mez	Lauraceae
Tuwara (C)	*Chimarrhis Williamsii* Standl.	Rubiaceae
Ubiamba	*Miconia dichrophylla* Macbr.	Melastomaceae
Ubo	*Spondias Mombin* L.	Anacardiaceae
Uchpa-cacao (Q–S)	*Theobroma ferruginea* Bern.	Sterculiaceae
" " "	*Theobroma subincana* Mart.	Sterculiaceae
" -caspi (Q)	*Faramea glandulosa* P. & E.	Rubiaceae
" " "	*Henriettella verrucosa* Triana	Melastomaceae
" -mullu (Q)	*Coix Lachryma-Jobi* L.	Gramineae
" -pamashto (Q)	*Diospyros Poeppigiana* A. DC.	Ebenaceae
" -panga (Q)	*Cestrum strigillatum* R. & P.	Solanaceae
" -parinari (Q)	*Couepia* sp.	Rosaceae
" -poroto	*Cassia occidentalis* L.	Leguminosae
" -quinilla	*Lucuma* sp.	Sapotaceae
" -situlli (Q)	*Heliconia brasiliensis* Hook.	Musaceae
" -umarí (Q)	*Parinarium parile* Macbr.	Rosaceae
Uchu-caspi (Q)	*Casearia timbuchi* Macbr.	Flacourtiaceae
" -huaca (Q)	*Clibadium remotiflorum* O. E. Schulz	Compositae
" -huayo (Q)	*Mollia* sp.	Tiliaceae
" -huasca (Q)	*Paullinia moquisapaensis* Macbr.(?)	Sapindaceae
" -mullaca (Q)	*Casearia Blanchetiana* Miq.	Flacourtiaceae
" " "	*Miconia puberula* Cogn.	Melastomaceae
" " "	*Mollia lepidota* Spruce	Tiliaceae
" " "	*Trichilia maynasiana* C. DC.	Meliaceae
" " "	*Trichilia Riedelii* C. DC.	Meliaceae
" " "	*Trichilia Ruiziana* C. DC.	Meliaceae
" -sanango (Q)	*Faramea anisocalyx* P. & E.	Rubiaceae
" " "	*Tabernaemontana Poeppigii* Muell. & Arg.(?)	Apocynaceae
Ucsha-quiro (Q)	*Sclerolobium paniculatum* Vog.	Leguminosae
" " "	*Sclerolobium Uleanum* Harms	Leguminosae
Ucullucui (Q)	*Posoqueria latifolia* (Rudge) R. & S.	Rubiaceae
" "	*Stachytarpheta cayennensis* (Rich.) Vahl	Verbenaceae
" -sacha (Q)	*Heliotropium indicum* L.	Boraginaceae
Ucumi-micuna (Q)	*Psychotria alba* R. & P.	Rubiaceae
Umarí (Q)	*Poraqueiba sericea* Tul.	Icacinaceae
" amarillo (Q–S)	*Poraqueiba sericea* Tul.	Icacinaceae
" negro (Q–S)	*Poraqueiba sericea* Tul.	Icacinaceae
Uña de gato	*Piptadenia flava* (Spreng.) Benth.	Leguminosae
Ungurahui (Q)	*Jessenia Weberbaueri* Burret	Palmae
Urcu-cumala (Q)	*Lucuma bifera* Molina(?)	Sapotaceae
" -ingaina (Q)	*Erythroxylon lucidum* HBK.	Erythroxylaceae
" -moena (Q)	*Ocotea minutiflora* Schmidt	Lauraceae
" -tamara (Q)	*Leonia glycycarpa* R. & P.	Violaceae
Urpai-manchinga (Q)	*Trophis racemosa* (L.) Urban	Moraceae
" -micuna (Q)	*Conomorpha peruviana* A. DC.	Myrsinaceae
" " "	*Euphorbia hirta* L.	Euphorbiaceae
Ushun (Q)	*Spondias Mombin* L.	Anacardiaceae
" -moena (Q)	*Hufelandia* sp.(?)	Lauraceae
Uva	*Vitis vinifera* L.	Vitaceae

Common Name	Scientific Name	Family
Uvilla	*Pourouma cecropiaefolia* Mart.	Moraceae
"	*Pourouma Ulei* Warb.	Moraceae
Uvo	*Spondias Mombin* L.	Anacardiaceae
Vaca-nahui-huasca (S–Y–Q)	*Cissampelos Pereira* L.	Menispermaceae
Vaina de machete	*Bauhinia tarapotensis* Benth.	Leguminosae
Vainilla	*Vanilla* sp.	Orchidaceae
Varilla	*Acalypha scandens* Benth.	Euphorbiaceae
"	*Sommera sabiceoides* Schum.	Rubiaceae
" del agua	*Sideroxylon Ulei* Krause	Sapotaceae
Veneno-huasca (S–Q)	*Solanum* sp.	Solanaceae
Verbena	*Verbena litoralis* HBK.	Verbenaceae
Verdolaga	*Portulaca oleracea* L.	Portulacaceae
Vibora-huasca (S–Q)	*Phyllanthus* sp.	Euphorbiaceae
Violeta	*Viola odorata* L.	Violaceae
Virote-quiro (Q)	*Rinorea* sp.	Violaceae
Vito	*Genipa americana* L.	Rubiaceae
Vitoc-quiro (Q)	*Ilex* sp.	Aquifoliaceae
Viuda	*Angelonia* sp.	Scrophulariaceae
Yaco-chihua (Q)	*Alchornea castaneifolia* (Willd.) Juss.	Euphorbiaceae
" -huito or -vito (Q)	*Genipa americana* L.	Rubiaceae
" -moena (Q–C)	*Ajouea Jelskii* Mez	Lauraceae
" -mullaca	*Aciotis purpurascens* (Aubl.) Triana	Melastomaceae
" "	*Tococa glandulosa* Gleason	Melastomaceae
" "	*Tococa lasiostyla* Cogn.	Melastomaceae
" -pashaco (Q)	*Piptadenia* sp.	Leguminosae
" " "	*Pithecolobium Spruceanum* Benth.	Leguminosae
" -rumu-shimbillo (Q–S)	*Inga* sp.	Leguminosae
" -sanango (Q)	*Macoubea paucifolia* (Spreng.) Mgf.	Apocynaceae
" " "	*Tabernaemontana Sananho* R. & P.	Apocynaceae
" -shapana (Q)	*Inga* sp.	Leguminosae
" -shimbillo (Q–S)	*Hirtella pilosissima* Mart. & Zucc.	Rosaceae
" " "	*Inga* sp.	Leguminosae
" -shutiri (Q)	*Hyptis Parkeri* Benth.	Labiatae
" " "	*Polygonum punctatum* Ell.	Polygonaceae
" " "	*Psychotria calochlamys* Standl.	Rubiaceae
" " "	*Psychotria cuspidata* Bredem.	Rubiaceae
" " "	*Psychotria involucrata* Sw.	Rubiaceae
" -sisa (Q)	*Carludovica loretensis* Standl.	Cyclanthaceae
" " "	*Carludovica Williamsii* Standl.	Cyclanthaceae
" " "	*Chimarrhis Williamsii* Standl.	Rubiaceae
" " blanca (Q–S)	*Cephaelis rosea* Benth.	Rubiaceae
" -toé (Q)	*Datura* sp.	Solanaceae
Yana-caspi (Q)	*Trema micrantha* (L.) Blume	Ulmaceae
" -huasca (Q)	*Duguetia* sp.	Anonaceae
" " "	*Guatteria hyposericea* Diels	Anonaceae
" -huira (Q)	*Cassia viminea* L.	Leguminosae
" -huiraru (Q)	*Cassia viminea* L.	Leguminosae
" -muco (Q)	*Neea parviflora* P. & E.	Nyctaginaceae
" -mullaca	*Clidemia hirta* (L.) Don	Melastomaceae
" "	*Turpinia heterophylla* (R. & P.) H. & L.	Staphyleaceae

Common Name	Scientific Name	Family
Yana-ocuera (Q)	*Oliganthes discolor* (HBK.) Sch. Bip.	Compositae
" " "	*Oliganthes Karstenii* Sch. Bip.	Compositae
" " de oyada	*Acalypha macrophylla* Ule	Euphorbiaceae
" -panga (Q)	*Miconia pteropoda* Benth.	Melastomaceae
" -pichirina (Q)	*Vismia* sp.	Hypericaceae
" -vara (Q–S)	*Acalypha macrostachya* Jacq.	Euphorbiaceae
" -varas (Q–S)	*Marcgravia* sp.	Marcgraviaceae
" " "	*Oliganthes discolor* (HBK.) Sch. Bip.	Compositae
" " "	*Unonopsis* sp.	Anonaceae
" -varilla (Q–S)	*Acalypha diversifolia* Jacq.	Euphorbiaceae
" " "	*Acalypha macrostachya* Jacq.	Euphorbiaceae
Yerba amarga	*Hemidiodia ocimifolia* (Willd.) Schum.	Rubiaceae
" de chacra	*Jussiaea linifolia* Vahl	Onagraceae
" colorada	*Euphorbia hirta* L.	Euphorbiaceae
" de jergón	*Dracontium* sp.	Aracaceae
" Luisa	*Cymbopogon citratus* (DC.) Stapf.	Gramineae
" de mariposa	*Chelonanthus acutangulus* (R. & P.) Gilg	Gentianaceae
" del monte	*Pavonia leucantha* Garcke	Malvaceae
" santa	*Cestrum Sendtnerianum* Mart.	Solanaceae
Yumanilla (Q)	*Anemia Phyllitidis* (L.) Sw.	Schizaeaceae
Yurac-ingaina (Q)	*Mauria suaveolens* P. & E.	Anacardiaceae
" -moena (Q)	*Ocotea rubrinervis* Mez	Lauraceae
" -mullaca (Q)	*Miconia albicans* (Sw.) Triana	Melastomaceae
" -siprana (Q)	*Croton matourensis* Aubl.	Euphorbiaceae
" -tortilla-caspi (Q–S)	*Allophylus divaricatus* Radlk.	Sapindaceae
" -varilla (Q)	*Rinorea* sp.	Violaceae
Yutobanco (Q)	*Erythroxylon macrophyllum* Cav.	Erythroxylaceae
" "	*Miconia ceramicarpa* (DC.) Cogn.	Melastomaceae
" "	*Hamelia lutea* Rohr.	Rubiaceae
" "	*Leandra* sp.	Melastomaceae
Zapallito	*Gurania spinulosa* (P. & E.) Cogn.	Cucurbitaceae
Zapatito del niño	*Pedilanthus* sp.	Euphorbiaceae
Zapote	*Matisia cordata* Humb. & Bonpl.	Bombacaceae
" del mono	*Carpotroche longifolia* (P. & E.) Benth.	Flacourtiaceae
" silvestre	*Sterculia Tessmannii* Mildbr.	Sterculiaceae
Zapotillo	*Matisia ochrocalyx* L.	Bombacaceae
"	*Quararibea Wittii* K. Schum. & Ulbr.	Bombacaceae
Zapotina	*Chrysophyllum Klugii* Baehni	Sapotaceae
Zarzamora	*Rubus urticifolius* Poir.	Rosaceae
Zarzaparrilla	*Smilax* sp.	Smilacaceae

BIBLIOGRAPHY

REFERENCES PERTAINING TO FLORA AND FOREST PRODUCTS OF PERU

Anonymous. Adopción de un régimen forestal en el Peru. Bol. del Min. de Fomento, Direccion de Fomento. Lima, 1909.

——— Itinerario de los viajes de Raimondi en el Peru. Bol. Soc. Geog. de Lima **31**: 75–85. 1915.

——— Decreto sobre protección a los árboles. El Peruano (Lima), p. 9. Jan. 5, 1920.

——— Executive decree for the protection of trees in the Republic. Bull. Pan Amer. Union **50**: 475. 1920.

Ball, John. Contributions to the flora of the Peruvian Andes, with remarks on the history and origin of the Andean flora. Lin. Soc. Journ. Bot. **22**: 1–64. 1885–86.

Barrel, Georges H. Walnut in Amazonas. Tropical Woods **10**: 51–53. 1927.

——— Notes on Amazonia. Tropical Woods **11**: 1–4. 1927.

Blake, Sidney F. Note on "arboloco." Tropical Woods **7**: 33–34. 1926.

——— Note on the Peruvian mahogany. Tropical Woods **14**: 33. 1928.

Bruns, Ferdinand. Beiträge zur Kenntnis der Vegetation des Peruanischen Küstengebietes. Hamburg-Inst. für Allgem. Bot. **8**: 1–85. 1929.

Castre, Emilio. La flora del oriente peruano. Bol. Soc. Geog. de Lima **50**: 89–129. 1933.

Chevalier, August. Les vrais et les faux balatas. Rev. Bot. Appl. et d'Agric. Trop. (Paris) **128, 129**: 261–282, 347–358. ill. 1932.

Cook, O. F. Agriculture and native vegetation in Peru. Journ. Wash. Acad. Sci. **6**: 284–293. 1916.

——— Staircase farms of the ancients. Nat. Geog. Mag. (Washington) **29**: 474–534. ill. 1916.

Dennis, W. J. Industria nueva—Cube-barbasco. El Comercio (Lima). Aug. 14, 1935.

Ducke, Adolpho. Plantes nouvelles ou peu connues de la région amazonienne (IIIe Partie). Archiv. Jard. Bot. Rio de Janeiro **4**: 1–208. ill. 1925.
Describes several Peruvian genera and species.

——— As leguminosas do Estado do Pará. Archiv. Jard. Bot. Rio de Janeiro **4**: 209–341. 1925.

——— Notes sur le genre *Hevea* Aubl. Rev. Bot. Appl. et d'Agric. Trop. (Paris) **9**: 98: 623–630. ill. 1929.
Contains a key to seventeen species of *Hevea*, with notes on each species.

——— Supplément aux notes sur le genre *Hevea* Aubl. Rev. Bot. Appl. et d'Agric. Trop. (Paris) **10**: 111: 27–30. 1930.

——— Les arbres producteurs de "balata." Rev. Bot. Appl. et d'Agric. Trop. (Paris) **10**: 111: 849–851. 1930.

——— Notes sur l'origine du copahu de la région amazonienne. Rev. Bot. Appl. et d'Agric. Trop. (Paris) **12**: 130: 433–437. 1932.
Describes species of *Copaifera* capable of furnishing copaiba balsam.

Ducke, Adolpho. Neue Arten aus der Hylaea Brasiliens. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **11:** 579–591. 1932.

Eight new species and varieties are described from Brazil and Peru.

——— Plantes nouvelles ou peu connues de la région amazonienne. Archiv. Jard. Bot. Rio de Janeiro **6:** 1–107. pls. 1–11. 1933.

Some Peruvian species described.

——— Nova Sopatacea productora de balata, da Amazonia brasileira. Ann. Acad. Brasil. de Sci. (Rio de Janeiro) **6:** 207–210. ill. 1934.

——— Colheita de material botánico na região amazonica (Relatorio 1931–1933). Bol. Ministério da Agricultura (Rio de Janeiro) 33–47. 1934.

——— Relatorios das commissões desempenhadas pelo chefe do secção de botanica, Adolpho Ducke, na região amazonica durante os annos de 1919 a 1928. Rodriguésia **1:** 17–71. 1935.

——— Le "pajurá" et le "parinary" d'Amazonie. Rev. Bot. Appl. et d'Agric. Trop. (Paris) **15:** 179–182. ill. 1935.

——— Revision of the genus *Hevea* Aubl., mainly the Brazilian species. Archiv. Inst. de Biol. Veget. **2:** 217–246. pls. 1–3. 1935.

——— Notes on the Myristicaceae of Amazonian Brazil, with descriptions of new species. I, II. Journ. Wash. Acad. Sci. **26:** 213–222, 253–264. 1936.

Describes several genera and species found in Peru.

Enock, C. Reginald. The Andes and the Amazon, life and travel in Peru. xvi + 379 pp. ill. London, 1907.

——— Peru, its former and present civilization. xxxii + 320 pp. ill. London, 1920.

Farabee, William Curtis. The Amazon Expedition of the University Museum. Univ. Penn. Mus. Journ. **7:** 210–244. 1916; **8:** 61–82, 126–144. 1917.

Filho, Adrião Caminha. Timbós e rotenona: uma riqueza nacional inexplorada. Pub. No. 1, Conselho Florestal Federal (Rio de Janeiro) 11 pp. 1935.

Francey, Pierre. Monographie du genre *Cestrum* L. Candollea (Geneva) **6:** 46–398. 1935; **7:** 1–132. 3 pls. 1936.

Fries, R. E. Revision der Arten einiger Anonaceen-Gattungen. III. Acta Horti Bergiani (Upsala) **12:** 1–220. pls. 1–20, figs. 1–14. 1934.

Garratt, George A. The wood of *Symphonia globulifera.* Tropical Woods **45:** 1–15. 1936.

Gleason, H. A., and Panshin, A. J. *Swietenia Krukovii:* a new species of mahogany from Brazil. Amer. Journ. Bot. **23:** 1: 21–25. ill. 1936.

Haught, Oscar. A new Peruvian *Capparis.* Tropical Woods **20:** 30–31. 1929.

Herrera, Fortunato L. Nomenclatura indígena de las plantas Cuzcoensis. Inca **1:** 67–263. 1923.

——— Chloris Cuzcoensis. Anales de la Universidad del Cuzco (Cuzco) **1:** 1: 1–220. 1926.

——— Contribuciónes a la flora de Departamento del Cuzco. Revista Universitaria (Cuzco) **13:** 1: 66–88. 1929.

——— Nombres científicos y vulgares de algunas plantas indígenas en el Departamento del Cuzco. Revista Universitaria (Cuzco) **13:** 2: 365–395. 1929.

——— Estudios sobre la flora del Departamento del Cuzco. Plantarum Cuzcorum Herrerarianum. 257 pp. 19 pls. Lima, 1930.

——— El Inca Garcilasso de la Vega, primero botanista cuzqueño. Revista Universitaria (Cuzco) **20:** 5–42. 1931.

Herrera, Fortunato L. Estudios sobre la flora del Departamento del Cuzco. Ampliaciones. Revista Universitaria (Cuzco) **20**: 106–130. 1931.

——— Estudios sobre la flora del Departamento del Cuzco. Revista Universitaria (Cuzco) **20**: 254–262. 1931.

——— Riquezas vegetales del Oriente cuzqueño. Revista Universitaria (Cuzco) **20**: 163–173. 1931.

——— Estudios sobre la flora del Departamento del Cuzco. Revista Universitaria (Cuzco) **21**: 42–61. 1932.

——— Los Pisonaes del Departamento del Cuzco. Revista Chilena de Historia Natural (Santiago) **35**: 35–38. ill. 1932.

——— Estudios sobre la flora del Departamento del Cuzco. Revista Universitaria (Cuzco) **22**: 58–64. 1933.

——— El cedro peruano, *Cedrela Herrerae* Harms. Revista Sudamericana de Botánica (Montevideo) **1**: 21–27. 1934.

——— Estudios sobre la flora del Departamento del Cuzco. III Suplemento. Revista Universitaria (Cuzco) **23**: 1: 111–147. 1934.

Johnston, Ivan M. Studies in the Boraginaceae. XI. Journ. Arnold Arboretum (Jamaica Plain, Mass.) **16**: 145–205. 1935.

Peruvian species of *Cordia* described are *C. Klugii* and *C. ripicola*, with numerous notes upon plants of other genera and a monograph of the Old World species of *Tournefortia*.

Jones, Howard A. The rotenone content of derris root, cube root, and other plant materials. Journ. Wash. Acad. Sci. **23**: 36–46. 1933.

Killip, Ellsworth P. New plants mainly from western South America. Journ. Wash. Acad. Sci. **24**: 42–52. 1934.

———, and **Smith, A. C.** The identity of the South American fish poisons, "cube" and "timbó." Journ. Wash. Acad. Sci. **20**: 74–81. 1930.

——— South American plants used as fish poisons. 27 mimeographed pages. Washington, D.C., 1935.

Lanjouw, J. Studies in Moraceae. I. The genera *Trymatococcus* Poepp. et Endl. and *Craterogyne* Lanj. Med. Bot. Mus. Univ. Utrecht **32**: 20: 262–278. figs. 1–6. 1935.

——— Studies in Moraceae. II. The genus *Clarisia* Ruiz et Pavón and its synonyms, with a discussion of the generic name. Recueil des Trav. Bot. Néerlandais **33**: 254–276. figs. 1–3, pls. 9–11. 1936.

Macbride, J. Francis. Identity of the Peruvian mahogany. Tropical Woods **16**: 49–50. 1928.

——— Identity of the Peruvian Balsa. Tropical Woods **17**: 5–7. 1929.

——— A new *Miconia* and other large Melastomes of Peru. Tropical Woods **17**: 12–14. 1929.

——— Identity of "Cube," a Peruvian drug. Tropical Woods **18**: 56. 1929.

——— *Cornus*, a genus new to South America. Tropical Woods **19**: 4–5. 1929.

——— Spermatophytes, mostly Peruvian. Revista Universitaria (Cuzco) **20**: 84–90. 1931.

——— New or renewed spermatophytes, mostly Peruvian. Candollea (Geneva) **6**: 1–19. 1934.

——— Flora of Peru. Field Mus. Bot. **13**, pt. 1: 1–320. 1 map. 1936.

Mansfeld, R., and Sleumer, Hermann. Revision der Gattung *Befaria* Mutis. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **12**: 235–276. 1935.

Markgraf, Fr. Neue andine Melastomataceen. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **12**: 177–182. 1934.

New species in the genera *Leandra* and *Miconia*.

——— Neue Apocynaceen aus Südamerika. V. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **12**: 295–301. 1935.

One new species, *Aspidosperma rauwolfioides*, from Peru.

Markham, Clements R. Peruvian bark. xxiii + 550 pp. 3 ill., 3 maps. London, 1880.

Martínez, Maximino. Arbol de bálsamo, *Toluifera Pereirae* (Klotszch) Baill. Bol. Dirección de Estud. Biológ. **3**: 3: 49–51. 1926.

Means, Philip Ainsworth. A glimpse of northern Peru. Bull. Pan Amer. Union **47**: 333–349. ill. 1918.

——— Social conditions in the Piura-Tumbes region of northern Peru. Scientific Monthly (Lancaster, Pa.) **7**: 385–399. 1918.

——— A study of ancient Andean social institutions. Trans. Conn. Acad. Arts and Sciences **27**: 407–469. 1925.

Moldenke, Harold Norman. A monograph of the genus *Aegiphila*. Brittonia (Lancaster, Pa.) **1**: 245–477. 1934.

——— Studies of new and noteworthy tropical American plants. Phytologia (New York) **1**: 95–105. ill. 1934.

Mortimer, W. Golden. Peru, history of coca. xxvi + 576 pp. ill. New York, 1901.

Petersen, George. Estudios climatológicos del noroeste Peruano. Bol. Soc. Geol. del Peru (Lima) **7**: 1–141. 1935.

Poeppig, Edward. Reise in Chile, Peru und auf dem Amazonstrome während der Jahre 1827–1832. 2 vols., 930 pp. Leipzig, 1835–36.

Record, Samuel J. Distribution of the species of *Swietenia*. Tropical Woods **1**: 2–4. 1925.

——— Mahogany in the upper Amazon. Tropical Woods **6**: 1–2. 1926.

——— Walnut woods—true and false. Tropical Woods **18**: 4–29. 1929.

——— Notes on tropical timbers—mahogany in western Brazil. Tropical Woods **22**: 10–11. 1930.

———, and **Clayton D. Mell.** Timbers of tropical America. xviii + 610 pp. 51 pls. New Haven, 1924.

Rimbach, August. The forests of Ecuador. Tropical Woods **31**: 1–9. 1932.

Lists several genera and species native to Peru.

Rosell, Ricardo Garcia. Conquista de la montaña. Sinopsis de los descubrimientos, expediciónes, estudios y trabajos llevados a cabo en el Peru para el aprovechamiento y cultura de sus montañas. La Prensa (Lima). 59 pp. 1905.

Ross, Alexander. A recent journey to the headwaters of the Ucayali, central Peru. Roy. Geog. Soc. Proc. (London) ser. 2, **14**: 282–297. 1892.

Salomon, Oscar Victor. The forests of Peru. Bull. Pan Amer. Union **56**: 4: 377. 1923.

Schmidt, Otto Chr. Beiträge zur Kenntnis der Andinen Südamerikanischen Lauraceen. I. Repertorium Specierum Novarum (Berlin-Dahlem) **31**: 168–189. 1933.

Schurz, William L., Hargis, O. D., Marbut, C. F., and Manifold, C. B. Rubber production in the Amazon Valley. Trade Promotion Series No. 23, Bureau Foreign and Domestic Commerce (Washington). 369 pp., 45 halftones and maps. 1925.

Sleumer, Hermann. Beiträge zur Kenntnis der Flacourtiaceen Südamerikas. II. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **12**: 50–56. 1934.

——— Eine neue Art der Gattung *Aveledoa* Pittier. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **12**: 148–150. 1934.

A. Tessmanniana from Peru.

——— Dilleniaceae americanae novae. Repertorium Specierum Novarum (Berlin-Dahlem) **39**: 44–47. 1935.

New species, *Dolichocarpus amazonicus*.

——— Ericaceae novae. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **12**: 478–486. 1935.

Leucothoe andina from Peru.

——— Vermischte Diagnosen. III. Repertorium Specierum Novarum (Berlin-Dahlem) **39**: 274–282. 1936.

Mollinedia pulcherrima and *Minquartia punctata* [Radlk.] Sleumer.

——— Über die Gattung *Themistoclesia* Kl. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **13**: 108–111. 1936.

T. Pittieri described as new.

——— Die Arten der Gattung *Vaccinium* L. in Zentral- und Südamerika. Notizbl. Bot. Gart. & Mus. Berlin-Dahlem **13**: 111–140. 1936.

Solano, J. O., and Esposto, N. Informe sobre algunas especies forestales peruanas, emitido por el Jefe de la Sección de Arboricultura y Horticultura a pedido del Señor Director General de la Unión Panamericana. Lima, 1926.

Sperber, O. Timber growth of the montaña of Peru. American Lumberman (Chicago), p. 46. August, 1913.

Spruce, Richard. Notes of a botanist on the Amazon and Andes. 2 vols., ii + 518, xii + 542. ill. London, 1908.

Standley, Paul C. *Macbrideina*, a new genus of trees of the family Rubiaceae. Tropical Woods **20**: 24–26. 1929.

——— New names for tropical American trees. Tropical Woods **34**: 39–41. 1933.

Includes some Peruvian genera.

——— The genus *Cornus* in South America. Tropical Woods **43**: 16–17. 1935.

——— Studies of American Plants—VI. Field Mus. Bot. **11**: 145–276. 1936.

Describes some Peruvian genera and species, mostly in the family Rubiaceae, and includes also many transfers of names.

——— Rubiaceae. Field Mus. Bot. **13**, pt. 6: 1–261. 1936.

Trelease, William. Piperaceae. Field Mus. Bot. **13**, pt. 2: 1–253. 1936.

Tschudi, J. J. von. Travels in Peru during the years 1838–1842. Translated from the German by Thomasina Ross. 354 pp. New York, 1848.

Weberbauer, A. Die Pflanzenwelt der Peruanischen Anden. Engler and Drude, Die Vegetation der Erde **12**: 355 pp. Leipzig, 1911.

——— Die Vegetationsgliederung des nördlichen Peruum 5° südl. Bot. Jahrb. **50**: Suppl. 72–94. 1914.

Weberbauer, A. Phytogeography of the Peruvian Andes. Field Mus. Bot. **13**, pt. 1: 13–81. 1936.

Williams, Llewelyn. The forests of northeastern Peru. Tropical Woods **25**: 5–12. 1931.

——— Note on walnut in northeastern Peru. Tropical Woods **27**: 16–17. 1931.

——— East of the Andes. Bull. Pan Amer. Union **65**: 612–627. 1931.

——— Peruvian mahogany. Tropical Woods **31**: 30–37. 1932.

Wilson, Lucy L. W. Climate and man in Peru. Bull. Phil. Geog. Soc. **8**: 79–97, 153–171. 1910.

Zon, Raphael, and **Sparhawk, William N.** Forest resources of the world. **2**: 788–794. 1923.

REFERENCES PERTAINING TO WOOD STRUCTURE

Bailey, Irving W. Preliminary notes on cribriform and vestured pits. Tropical Woods **31**: 46–48. 1932.

——— The cambium and its derivative tissues. No. VIII. Structure, distribution, and diagnostic significance of vestured pits in Dicotyledons. Journ. Arnold Arboretum (Jamaica Plain, Mass.) **14**: 259–273. ill. 1933.

Chalk, L. Multiperforate plates in vessels, with special reference to the Bignoniaceae. Forestry (The Journal of the Society of Foresters of Great Britain) **7**: 1: 16–25. ill. 1933.

———, and **Chattaway, Margaret M.** Perforated ray cells. Proc. Roy. Soc. (London) **B**: 113: 82–92. 1933.

Chattaway, Margaret M. The wood of the Sterculiaceae. I. Specialization of the vertical wood parenchyma within the sub-family Sterculiaceae. The New Phytologist (Cambridge) **31**: 2: 119–132. ill. 1932.

——— Tile cells in the rays of the Malvales. The New Phytologist (Cambridge) **32**: 4: 261–273. ill. 1933.

Diehl, George A. A study of the Lecythidaceae. Tropical Woods **43**: 1–15. 1935.

Garratt, George A. Systematic anatomy of the woods of the Myristicaceae. Tropical Woods **35**: 6–48. ill. 1933.

——— Bearing of wood anatomy on the relationships of the Myristicaceae. Tropical Woods **36**: 20–44. 1933.

——— Systematic anatomy of the woods of the Monimiaceae. Tropical Woods **39**: 18–44. pls. 1–4. 1934.

Glossary of terms used in describing woods. Tropical Woods **36**: 1–12. 1933.

Hess, Robert W. Occurrence of raphides in wood. Tropical Woods **46**: 22–31. 1936.

Janssonius, H. H. Mucilage cells and oil cells in the woods of the Lauraceae. Tropical Woods **6**: 3–4. 1926.

Kribs, David A. Comparative anatomy of the woods of the Meliaceae. Amer. Journ. Bot. **17**: 8: 724–738. 1930.

——— Salient lines of structural specialization in the wood rays of Dicotyledons. Bot. Gaz. (Chicago) **96**: 3: 547–557. ill. 1935.

Record, Samuel J. Intercellular canals in Dicotyledonous woods. Journ. Forestry **16**: 4: 429–441. 1918.

——— Secretory cells in Dicotyledonous woods. Tropical Woods **1**: 9–12. 1925.

Record, Samuel J. Pits with cribriform membranes. Tropical Woods **2**: 10–13. 1925.

——— Occurrence of intercellular canals in Dicotyledonous woods. Tropical Woods **4**: 17–20. 1925.

——— Occurrence of "ripple marks" in woods. Tropical Woods **9**: 13–18. 1927.

——— Identification of the timbers of temperate North America. ix + 200 pp. ill. New York, 1934.

——— Classifications of various anatomical features of Dicotyledonous woods. Tropical Woods **47**: 12–27. 1936.

Solereder, Hans. Systematic anatomy of the Dicotyledons. Translated by A. L. Boodle and F. E. Fritsch. 2 vols., x + 1182 pp. ill. Oxford, 1908.

Tupper, Walter W. Woods with conspicuously large rays. Tropical Woods **11**: 5–9. 1927.

——— A comparative study of Lauraceous woods. Amer. Journ. Bot. **14**: 9: 520–524. ill. 1927.

——— Preliminary report on the wood structure of the Flacourtiaceae. Tropical Woods **38**: 11–14. 1934.

Webber, Irma E. Bearing of upright ray cells in the wood of *Hibiscus mutabilis* L. on usage of the term tile cell. Tropical Woods **37**: 9–13. 1934.

——— The wood of *Hibiscus tiliaceus* L. Tropical Woods **37**: 14–18. 1934.

——— Systematic anatomy of the woods of the Malvaceae. Tropical Woods **38**: 15–36. pls. 1–5. 1934.

Williams, Llewelyn. A study of the Caryocaraceae. Tropical Woods **42**: 1–18. 1935.

INDEX

Page numbers in **bold-faced** type refer to descriptions of woods.

Aberemoa quitarensis, **122**
  Spixiana, **123**
Abuta, 115
  concolor, **115**
Acacia, 18, **179**
  Farnesiana, **179**
  paniculata, **180**
  polyphylla, **180**
Acalypha, **265**
  cuneata, **265**
  diversifolia, **265**
  macrophylla, **266**
  macrostachya, **267**
Acanthaceae, **448**
Acanthus family, **448**
Acer, 368
Aciotis, 16
Acrodiclidium, 147
  armeniacum, **147**
Adenaria, 367
  floribunda, **367**
Aegiphila, 435, **436**
  filipes, **436**
  peruviana, **437**
  Smithii, **437**
Agricultural crops, 38
  methods, 22, 39
Agriculture, 22, 34, 38
Ahuashi-yaco, 12
Airplane routes, 36
Ajouea, 147
  Jelskii, **147**
Alchornea, 264, **267**
  castaneifolia, **267**
  glandulosa, **268**
  triplinervia, **268**
  triplinervia var. *crassifolia*, **269**
Alibertia, **452**
  edulis, **452**
  stenantha, **453**
Allophylus, **292**
  divaricatus, **293**
  floribundus, **293**
  leiophloeus, **293**
  punctatus, **294**
  scrobiculatus, **294**
Alseis, 453
  peruviana, **453**
Altura, 16, 18, 20
Amazon, Brazilian, 7
  Peruvian, 7, 20, 36
  region, 7
  River, 34, 36, 38, 41, 48, 51
  Valley, 32, 48
  zones of, 7
Amazonas, Department, 10, 14, 15, 38, 39, 47
Anacardiaceae, **283**
Anacardium, 284
  occidentale, 23, **284**
Anatomical characters (tables), 511
Anatto family, 345
Anaxagorea, **117**
  minor, **117**
  pachypetala, **117**
  pallida, **118**
Andean ranges, 34, 36
Andes, 7, 34, 36, 38, 52
  Peruvian, 15
Aniba, 26, **148**
  amazonica, **148**
  Williamsii, **149**
Anisomeris, 454
  paniculata, **454**
Anona, **118**
  montana, **118**
  muricata, **119**
  scandens var. *polychyla*, **119**
  Tessmannii, **119**
Anonaceae, **116**
Anonocarpus, 72
  amazonicus, **72**
Anthodiscus, 329, 330
  glaucescens, 330
  montanus, 329, 330, 332
  obovatus, 331
  peruanus, 331
  trifoliatus, 331
Aparisthmium, 269
  cordatum, **269**
Apeiba, **302**
  aspera, **302**, 304
  Tibourbou, 26, **303**
Apocynaceae, **419**
Aptandra, 102
  Spruceana, **102**
Aquifoliaceae, **289**
Araliaceae, 28, **399**
Arcytophyllum setosum, 30
  thymifolium, 30
Area, montaña, 15
  Peru, 14
Arrangement of parenchyma (table), 520
Artocarpus, **73**
  communis, 24, 73
Aspidosperma, 420
  subincanum, 26, **420**
Associations, 15
Astrocaryum, 10, 16, 26
Astronium, 284, **285**
Attalea, 10

Baccharis, 24
  odorata, 30

Bactris, 16
Bagasán, 13
Balata, 20, 50, 412
  exports of, 51
  varieties of, 51
Balsapuerto, 12
Banara, **351**
  guianensis, **351**, 352
  mollis, **352**
  nitida, **352**
Banisteria, 257
  Caapi, 257
  elegans, 16
  quitensis, 258
Bauhinia, 23, **192**
  tarapotensis, **193**
Bean family, **178**
Bellucia, **376**
  grossularioides, **377**, 378
  Weberbaueri, **377**
Bertholletia, 20
Bertiera, 454
  guianensis, **454**
Betula, 288
  lenta, 232
Bibliography, 568
Bignoniaceae, **444**
Bignonia family, **444**
Biseriate rays (table), 532
Bixa, 345
  Orellana, 23, **345**
Bixaceae, 345
Bladdernut family, 290
Blowpipes, wood for, 20
Boehmeria, 96
  pallida, **96**
Bolivia, 52
Bombacaceae, **309**
Bombax, 23, **310**
  aquaticum, **311**
  Munguba, **311**
  paraense, **312**
Bonnetia, 335
  paniculata, 26, **335**
Borage family, 431
Boraginaceae, 431
Bothriospora, 455
  corymbosa, 23, **455**
Boxwood, 476
Brachyotum lycopodioides, 30
  Trianaei, 30
Brazil, 48
Brazil-nut family, **369**
Brosimum, **74**
Brow of the forest, 13, 28
Buckthorn family, **298**
Buckwheat family, **106**
Bunchosia, 257, **258**
  elliptica, **258**
  Hookeriana, **259**
Burseraceae, **231**
Byrsonima, 257, **259**
  coriacea, **260**
  fluminensis, **260**
  spicata, **261**

Caballo-cocha, 10
Cacao family, **317**
Cacti, 30
Caesalpinia, 193
  pulcherrima, 23, **193**
Caesalpiniaceae, 179, 192
Caesalpinieae, 179, 192
Cajamarca, 12, 36
Caladium, 16
Calliandra, 180
  angustifolia, **180**
Callicarpa, 435, **437**
  spp., **438**
Calophyllum, 337, 338, 344
  brasiliense, 22, **338**
Calycophyllum, 455
  Spruceanum, 16, **455**
Calyptrella, 378
  cucullata, **378**
Campana, 13
Campsiandra, 194
  laurifolia, **194**
Canals, intercellular (table), 526
Caper family, **163**
Capirona, 456
  decorticans, **456**
Capparidaceae, **163**
Capparis, **163**
  nitida, **163**
  petiolaris, **164**
  Quina, **165**
  Schunkei, **165**
  tarapotensis, **165**
Carapa, 237
  guianensis, **237**
Carex, 28
Carica, 365
  Papaya, **365**
Caricaceae, 365
Carludovica palmata, 13, 26
Carpotroche, **352**
  longifolia, **353**
  parvifolia, **353**
Caryocar, 329, 330, **331**
  coccineum, **332**
  glabrum, 18, **332**
  gracile, 332
  Tessmannii, **333**
Caryocaraceae, **329**
Casearia, 351, **354**, 476
  Blanchetiana, **354**
  iquitosensis, **355**
  javitensis, **355**
  macrophylla, **355**
  parvifolia, **356**
  Poeppigii, **356**
  praecox, 454

Casearia reginae, **356**
sylvestris, **357**
sylvestris var. *martinensis*, 357
tarapotina, **357**
timbuchi, **358**
Cashew family, **283**
Cassia, 23, **195**
chrysocarpa, **195**
marginata, **195**
multijuga, **196**
occidentalis, 196
racemosa, **196**, 198
reticulata, 23, **197**
Ruiziana, **198**
viminea, **198**
Castilla, 72, 74
Ulei, 20, **74**
Catalpa, 447
Cecropia, 16, **75**
latifolia, **76**
leucocoma, **76**
obtusa, **76**
sciadophylla, **77**
Tessmannii, **77**
Cedar, exports of, 46
local uses of, 46
Spanish, 46
Cedrela, 26, 237, **238**
angustifolia, 238
fissilis, 26, 46, 238, **239**
Herrerae, 46, 238
odorata, 18, 46, 238, 239, **240**, 245
Ceja de la montaña, 13, 28
Celendín, 47
Celtis, 71
Cephaelis, 20, **457**
rosea, 457
tomentosa, **458**
Williamsii, 458
Cephalocereus, 30
Cereus, 30
Cerro Pelado, 12
Cespedesia, 326
Sprucei, 26, **326**
Cestrum, **440**
Baenitzii, **441**
racemosum, **441**
Sendtnerianum, **442**
Chachapoyas, 12, 13, 30, 32, 36, 40, 47
Chanchamayo Valley, 36, 47
Chasuta, 12, 14
Chimarrhis, 458
Williamsii, **458**
Chloranthaceae, 67
Chloranth family, 67
Chlorophora, 77
tinctoria, **77**
Cholos, 34
Chrysochlamys, 338
Weberbaueri, **338**
Chrysophyllum, **407**
Klugii, 20, **408**
Chrysophyllum sericeum, **408**
Cinchona, 16, 451, 459
amazonica, 461
bark, 459
discovery of, 459
distribution of, 459
officinalis, **461**
Citrus, 23, **222**
aurantifolia, **223**
Aurantium, 223
Limetta, **224**
medica, 224
Clarisia, 22, 79
nitida, **79**
Classification of material, 8, 60
Clavija, 406
sp., **406**
Cleidion, 270
amazonicum, **270**
Clibadium, 505
remotiflorum, **505**
sylvestre, 53
Clidemia, 20, 379
hirta, 23, 379
naevula, **379**
Climate, 30
Clusia, **339**
insignis, **340**
penduliflora, **340**
renggerioides, **340**
Spruceana, **340**
Clusia family, **337**
Coast, Pacific, 12, 36, 40, 47
Coca, 40, 52
cultivation of, 52
exports of, 53
family, **218**
Coccoloba, 16, **107**
Barbeyana, 22, **108**, 109
gracilis, **108**
peruviana, **108**
Williamsii, **109**
Cochaconga, Lake, 14
Cochiquina, 10
Cochlospermaceae, 346
Cochlospermum, **346**
orinocense, **346**
Williamsii, 347
Cochlospermum family, 346
Cocos nucifera, 24
Coffea, 459, 462
arabica, 451, 462
Coffee growing, 39, 40
Collecting regions, 60
Collector's numbers, 60
Colombia, 15, 52
Combretaceae, 372
Combretum family, 372
Common names (list), 536
Communications, 36
Compositae, **504**
Composition of forest, 15

Compsoneura, 130
capitellata, **130**
Condaminea, 462
corymbosa, 462
Condylocarpon, 420
pubiflorum, **420**
Connaraceae, 176
Connarus, 22, **176**
Connarus family, 176
Patrisii, **177**
Sprucei, **177**
Conomorpha, 403
peruviana, **403**
Conspicuous rays (table), 522
Copaifera, 198
reticulata, **198**
Corchorus, 301
Cordia, **431**, 434
alliodora, **432**, 433
heterophylla, **433**
laurifolia, **433**
nodosa, **433**
rotundifolia, 30
tetrandra, **434**
Ulei var. *ucayaliensis*, **434**
Cordilleras, 15, 38, 47
Corrigimento, 13
Costus, 26
Cotton, 39, 40
Couepia, **168**
canomensis, **168**
chrysocalyx, **169**
paraensis, **169**
racemosa var., **170**
speciosa, **170**
subcordata, **170**
Ulei, 16, **171**
Williamsii, **171**
Couma, 20, **421**, 425
spp. **421**, **422**
Coussapoa, 79
grandiceps, **79**
Coussarea, **462**
brevicaulis, **462**
hirticalyx, **463**
megalocarpa, **463**
ovalis, **463**
tenuiflora, **464**
tricephala, **465**
Coutarea, 465
hexandra, 18, **465**
Crataeva, **166**
Tapia, 23, **166**
Cremastosperma, 120
gracilipes, 120
Crepidospermum, 232
Goudotianum, **232**
Crescentia, 444, 445
Cujete, **445**
Crops, 34, 38, 39, 40
Croton, 26, 264, **271**
cuneatus, **271**
Croton glabellus, **272**
matourensis, **272**
palanostigma, **273**
peruvianus, 24
Crudia, 199
parivoa, **199**
Cube-barbasco, 53
analysis of, 54
exports of, 55
Cultivated land, 39
trees, 23, 59
Cumbasa, 12
Cupania, 292, **295**
cinerea, **295**
Cuphea, 16
speciosa, 16
Curatella, 325
americana, 26, **325**
Custard Apple family, **116**
Cuzco, Department, 46
Cymbopetalum, **120**
longipes, **120**
Tessmannii, **121**
Cynometra, 200
bauhiniaefolia, **200**
Cyperaceae, 26
Cyphomandra, 440, **442**
sp., **443**

Daguas, 30
Dalbergia, 211
inundata, 16, **211**
Density (table), 512
Department, Amazonas, 14, 34, 38, 39, 47
Cuzco, 46
Loreto, 8, 16, 34, 38
San Martín, 10, 34, 39, 41
Descriptions of woods, 60
Desmodium, 16
Dialium, **200**
acuminatum, **201**
Dichapetalaceae, 262
Dichapetalum family, 262
Diclinanona, 121
calycina, **121**
Dictyoloma, 224
peruvianum, 26, **224**
Didymopanax, **400**
Morototoni, 26, **400**
Dilleniaceae, 325, 403
Dillenia family, 325
Diospyros, **416**
peruviana, **416**
Poeppigiana, **417**
Diseases, 30
Dodonaea viscosa, 30
Dogbane family, **419**
Dry-land formation, 20
Drymonia, 448
sp., **448**

Duguetia, **122**
quitarensis, **122**
Spixiana, **123**
Duroia, 22, **466**
hirsuta, **466**, 467
longifolia, **466**
trichocarpa, **467**

Ebenaceae, 416
Ebony family, 416
Echites, 422
spectabilis, 422
Ecuador, 15, 52
Elaeocarpaceae, **299**
Elaeocarpus family, **299**
Elm, 432
Elm family, 71
El Morro, 13
Embothrium, 99
mucronatum, 30
Weberbaueri, **99**
Endlicheria, 20, **149**
anomala 16, **150**, 151
Williamsii, **150**
Entada, 181
polyphylla, **181**
Erythrina, 22, **212**
esculenta, **212**
glauca, **213**
Ulei, **213**
Erythrochiton, 225
brasiliense, **225**
Erythroxylaceae, 218
Erythroxylon, **218**
amplum, **219**
Coca, 52, 218
lucidum, **219**
macrocnemium, **219**
macrophyllum, **220**
Mamacova, **220**
paraense, **221**
Shatona, **221**
Eucalyptus, 30, 374
Euphorbiaceae, **264**
Euterpe, 16
Evening Primrose family, 399
Exploitation of forest products, 40
Explorers, earlier botanical, 7

Fabaceae, 179, 211
Faramea, 20, **467**
amplifolia, **468**
anisocalyx, **469**
capillipes, **469**
glandulosa, **469**
maynensis, **470**
quinqueflora, **470**
rectinervia, **471**
Ferdinandusa, 471
chlorantha, **471**
Festuca, 28
Ficus, 72, **80**
anthelminthica, **81**
caballina, **81**
gemina, 26, **82**
glabrata, **82**
Mathewsii, **83**
paraensis, **83**
Ruiziana, **84**
sp., **85**
Weberbaueri, **84**
Field crops, 39
numbers, 60
Fish poisons, 53
Flacourtiaceae, **350**
Flacourtia family, **350**
Flood-free formation, 20
Flood periods, 38
Forest, composition, 15
high rain, 26
low rain, 26
primary, 16
secondary, 16
products, 40
Formation, flood-free, 20
intermediate, 18
secondary, 22
swamp, 16, 26
Formations, 15
Fortaleza, 12
Four-o'clock family, **112**
Fourcroya, 30
Funtumia elastica, 419

Gaultheria erecta, 30
Genipa, 472
americana, **472**
Geography of Peru, 14
Gesneria family, 448
Gesneriaceae, 448
Gilibertia, 401
Williamsii, **401**
Ginseng family, **399**
Gloeospermum, 347, 348
Sprucei, **348**
Gonzalagunia, 473
cornifolia, **473**
Gouania, 298
Lupuloides, **298**
Government of Peru, 14
Graffenrieda, 379
limbata, **379**
Grasses, 28
Grassland, 24
Grias, 370
Neuberthii, **370**
Guarea, 22, **242**
aligera, **242**
filiformis, **243**
fissicalyx, **243**
grandifolia, **244**
maynasiana, **244**
trichilioides, **245**

Guatteria, **123**
hyposericea, **123**
microcarpa, **124**
phanerocampta, **124**
Guayapurima, 12
Guazuma, **318**
crinita, 23, **319**
ulmifolia, 23, 26, 30, 318, **319**
Gustavia, 53, 369, **371**
caballoensis, **371**
Guttiferae, **337**
Gynerium, 16

Hamelia, 473
lutea, **473**
Hancornia, 425
Hasseltia, 358
laxiflora, **358**
Hedyosmum, 67
racemosum, **67**
Heisteria, 102, **103**
cauliflora, **103**
cyanocarpa, **104**
densifrons, **104**
pallida, **105**
Heliconia, 26, 28
Heliocarpus, 302, 304
popayanensis, **304**
Helicteres pentandra, 24
Henriettella, 380
verrucosa, **380**
Hevea, 15, 18, 48, 264, **273**
brasiliensis, **274**
brasiliensis var. *janeirensis*, **275**
membranacea, **275**
microphylla, **276**
High rain forest, 26
Hibiscus, **307**
tiliaceus, **307**
Hippotis, 474
brevipes, **474**
Hirtella, 167, 168, **171**
americana, **172**
americana var. *hexandra*, **172**
americana var. *latifolia*, **173**
americana var. *oblongifolia*, **173**
pilosissima, **173**
Holly family, **289**
Huallaga River, 10, 12, 14, 24, 34, 36, 38, 39, 41, 44, 46, 48, 51, 54, 246
Hufelandia, 151
sp., **151**
Hura, 277
crepitans, 18, 53, **277**
Hymenaea, 202
palustris, 22, **202**
Hypericaceae, 344
Hyptis, 16

Icacinaceae, 291
Icacina family, 291
Ilex, 290
sp., **290**
Indian tribes, 34
Indoche River, 13
Inga, 23, **182**
edulis, **183**
graciliflora, **183**
ingoides, **184**
marginata, 16, **184**
pilosiuscula, **185**
plumifera, **185**
punctata, **185**
quaternata, **186**
Ruiziana, **186**
sertulifera, **187**
stenoptera, **187**
strigillosa, **188**
velutina, **188**
Inhabitants, 34
Inter-Andean valleys, slopes, 30
Intercellular canals (table), 526
Intermediate formation, 18
Ipomoea, 16
Batatas, 39
Iquitos, 8, 10, 14, 30, 34, 36, 38, 42, 44, 46, 47, 51, 54, 55, 246
Iryanthera, 22, **130**
juruensis, **131**
leptoclada, **131**
macrophylla, **131**
paraensis, **132**
sessilis, **132**
Tessmannii, **133**
Isertia, **474**
alba, **475**
rosea, **475**
Itaya River, 8, 10
Ixora, **476**
Finlaysoniana, **476**
Killipii, **477**
peruviana, **477**

Jacaranda, 22, 26, **445**
filicifolia, **446**
Jacaratia, 366
digitata, 366
Jacquinia, 53
Jaén, 36
Jalca, 13, 28, 30, 32
Jatropha, 26, 264, 278
Curcas, **278**
Javary River, 10, 20, 30, 38, 48
Juan Guerra, 12
Juanjui, 12
Juglandaceae, **68**
Juglans, 68, 431
neotropica, 16, 30, 47, **68**
Jurua River, 44
Jussiaea, 399
latifolia, **399**

Lacistema, **65**
aggregatum, **66**
Nena, **66**
rosidiscum, **67**

Lacistemaceae, 65
Lacistema family, 65
Ladenbergia, 478
magnifolia, **478**
Laetia, 359
suaveolens, **359**
Lagerstroemia indica, 367
Lamas, 12, 13, 24, 32, 34, 40
La Merced, 36
Land, cultivated, 39
Landolphia Kirkii, 419
owariensis, 419
Lantana Camara, 24
Laticiferous canals, 525
Lauraceae, 28, **146**
Laurel family, **146**
La Victoria, 10, 39
Lawsonia inermis, 367
Leaf characters (table), 533
Leandra, 376, 381
sp., **381**
Leatherwood family, 366
Lecythidaceae, **369**
Lecythis, 20, 372
sp., **372**
Leguminosae, **178**
Leonia, 347, 348
glycycarpa, **348**
Licania, 167, 168, **174**
elata, **174**, 175
octandra, **175**
Lichens, 28
Lima, 36
Lindackeria, 359
maynensis, **359**
Linden family, **301**
Lippia, 435, 438
virgata, 24, **438**
Liriodendron, 315
Liriosma, 102, **106**
gracilis, **106**
Spruceana, **106**
Local names, 536
Local uses of timbers, 40, 55
Loganiaceae, **417**
Lonchocarpus, **214**
confertiflorus, **214**
Nicou, 53, **215**
Loosestrife family, **367**
Loreto, Department, 8, 15, 16, 34, 38, 246
Low rain forest, 26
Lowland, tropical, 16
Lucuma, 407, 408, **409**
bifera, 20, **409**
Caimito, 18, **410**
dolichophylla, **411**
huallagae, **411**
Luehea, 302, **304**
tarapotina, **305**
Tessmannii, **305**
Lunania, 360
cuspidata, **360**
Lythraceae, **367**

Mabea, 264, **278**
subsessilis, 20, **279**
Machaerium, 215
sp., **215**
Machaonia, 478
Williamsii, **478**
Maclura aurantiaca, 78
Macoubea, 20, 422
paucifolia, **422**
Macrocnemum, 479
roseum, **479**
Macrolobium, **203**
acaciaefolium, **203**
taxifolium, **204**
Madder family, **451**
Madre de Dios, 15
Mahogany, 18, 22, 41, 245
Brazilian, 44
distribution of, 41
exploitation of, 41
exports of, 42
family, **236**
insect damage to, 44
Mainas, 10
Malachra, 308
alceifolia, **308**
Mallow family, **306**
Malmea, **125**
cuspidata, **125**
sp., **125**
Malouetia, **423**
furfuracea, **423**
furfuracea var. *grandifolia*, **424**
Tamaquarina, 18, **424**
Malpighiaceae, **257**
Malpighia family, **257**
Malvaceae, **306**
Manáos, 38, 44
Mangifera, 284
indica, 24
Manihot utilissima, 264
Manilkara, 407, **412**
bidentata, 20, 26, **412**
Maprounea, 279
guianensis, **279**
Marañón River, 10, 30, 34, 38, 47, 51, 69, 246
Marantaceae, 28
Marcgravia, **334**
Williamsii, **334**
Marcgraviaceae, 334
Marcgravia family, 334
Masán River, 8
Matayba, 296
purgans, **296**
Mathews, Alexander, 13
Matisia, 310, **312**
cordata, 18, **312**, 313
ochrocalyx, **313**

Mauria, 22, 284, 286
suaveolens, **286**
Mayna, 361
echinata, **361**
Mayo River, 12, 13, 24, 34, 36, 41
Melastomaceae, 28, **376**
Melastome family, **376**
Melastomes, 16
Melia, 237
Meliaceae, **236**
Menispermaceae, 115
Meriania, 376, 381
Spruceana, **381**
Mestizos, 34
Miconia, 20, **382**
amazonica, **382**
amplexans, **383**
aulocalyx, **384**
aurea, **384**
bubalina, **384**
calvescens, **385**
cannabina, **385**
capitata, **385**
chrysophylla, **386**
clavistyla, **386**
crassifolia, 30
dichrophylla, **386**
Donaeana, **387**
egensis, **387**
heteromera, **387**
juruensis, **388**
lepidota, **388**
longifolia, **389**
longiracemosa, **389**
Macbridei, 391
macrophylla, **390**
minutiflora, **390**
mollis, **391**
parviflora, **391**
Pilgeriana, **391**
Poeppigii, **392**
prasina, **392**
pteropoda, **393**
puberula, **393**
scorpioides, **394**
serialis, **394**
spennerostachya, **394**
stelligera, **395**
stenostachya, **395**
tetrasperma, **395**
Mimosaceae, 179
Mimoseae, 179
Molinobamba, 14, 30, 40
Mollia, 302, 306
sp., **306**
Mollinedia, **140**
casca, **141**
caudata, **141**
simulans, **142**
Monimiaceae, **140**
Monimia family, **140**
Montaña, 15, 22, 28, 34, 36, 38, 44, 46, 48, 53
area of, 15
Moonseed family, 115
Moorland, 13, 28
Moraceae, **71**
Morales, 12, 40
Morona River, 38, 44
Morro, El, 13
Morus, 78
Mouriria, 376, 396
grandiflora, **396**
Moyobamba, 12, 13, 14, 24, 32, 34, 36, 40, 41
Mulberry family, **71**
Muniches, village, 12
Muntingia, 300
Calabura, **300**
Musaceae, 26
Myriocarpa, 97
densiflora, **97**
Myristicaceae, **129**
Myroxylon, 216
balsamum, 22, **216**
Myrsinaceae, **402**
Myrsine family, **402**
Myrtaceae, **374**
Myrtle family, **374**

Nanay mills, 44
River, 8, 10, 20, 38, 48, 51, 246
Napo River, 10, 34, 38, 39, 40, 48, 51
Navigable rivers, 36
Navigation, 36, 38
Nauta, 10
Nectandra, **152**
acutifolia, **152**
globosa, **153**
maranonensis, **153**
Pichurim, **154**
pulverulenta, **154**
Neea, **112**
divaricata, **113**
floribunda, **113**
laxa, 113
parviflora, **114**
Spruceana, **114**
subpubescens, **114**
Negro River, 13
Nettle family, **95**
Nothopanax, 401
sp., **401**
Nutmeg family, **129**
Nyctaginaceae, **112**

Occurrence of raphides, 525
Ochnaceae, **326**
Ochna family, **326**
Ochroma, 14, 23, 72, 310, **314**
boliviana, 26, 30, **315**
Ocimum americanum, 24

Ocotea, **154**
cuprea, **155**
grandifolia, **155**
laxiflora, **156**
licanioides, **156**
maynensis, **157**
minutiflora, **157**
opifera, **158**
rubrinervis, **158**
tarapotana, **158**
Tessmannii, **159**
Trianae, **159**
Odor (table), 514
Ogcodeia, 22, **85**
Tamamuri, **85**
Tessmannii, **86**
Ulei, **86**
Oil cells, 525
Olacaceae, **102**
Olax family, **102**
Olea, 30
Oliganthes, **505**
discolor, 23, **506**
Karstenii, **506**
Olmedia, 87
aspera, **87**
Onagraceae, 399
Ophiocaryon, 297
heterophyllum, **297**
Orchidaceae, 28
Oreopanax, 402
Williamsii, **402**
Oryza latifolia, 16
Ossaea, 376, 396
micrantha, **396**
Osteophloeum, 133
platyspermum, **133**
Ouratea, 326, **327**
iquitosensis, **328**
pendula, **328**
Overland routes, 36
Oxalis, 24

Pacasmayo, 47
Pachisa, 12
Pachystachys, 449
Riedeliana, **449**
Pacific coast, 12, 36, 40, 47
Paita, 36
Palicourea, **479**
condensata, **480**
crocea, **481**
lasiantha, **481**
nigricans, **482**
paraensis, **482**
punicea, **482**
Palms, 10, 16, 24, 26, 28
Panama hat palm, 13, 26
Panicum barbinode, 16
Panopsis, 99, 100
rubescens var. *simulans*, **100**
Papilionatae, 179, 211
Pará, 8, 38
rubber, 20, 48, 264, 274
Parahancornia, 424
Amapa, 20, **424**
Paraíso, 10
Páramo, 28
Paranapura, 10, 54
Parenchyma, arrangement (table), 520
Parinarium, 168, 175
parile, **175**
Passiflora, 16
Pastasa River, 38, 44
Patrisia, 351, 362
pyrifera, **362**
Pavonia, 307, 308
leucantha, **308**
Pawpaw family, 365
Paypayrola, 347, 349
grandiflora, **349**
Pebas, 10, 34
Pentagonia, 483
velutina, **483**
Pepper family, 62
Pera, 280
sp., **280**
Perebea, 88
Chimiqua, **88**
Perforations, vessel (table), 527
Persea, 160
americana, 23, **160**
Peru, 14, 52
geography of, 14
Peruvian Amazon, 20, 34
bark, 459
-Brazilian border, 10
Pests, insect, 32
Phoebe, 160
pichisensis, **160**
Phyllanthus, **281**
grandifolius, **281**
Physiographic zones, 14
Physocalymma, 368
scaberrimum, 367, **368**
Phytelephas, 26, 51
Pichis Trail, 36, 47
Picramnia, **229**
lineata, **229**
macrostachys, **230**
magnifolia, **230**
martiniana, **231**
Piper, **62**
arrectispicum, **62**
fortalezanum, **62**
granuligerum, **63**
nanayanum, **63**
pebasense, **63**
Sellertianum, **64**
sericeonervosum, **64**
Stuebelii, **64**
yurimaguasanum, **65**
Piperaceae, 62

Piptadenia, 189
flava, 18, **189**
Piscohuañuna, 13
Pithecolobium, **189**
laetum, **190**
Mathewsii, 26, **191**
Saman, 26, **191**
Pits, vessel-ray (table), 528
vestured (table), 527
Platanus, 403
Pleurothyrium, **161**
densiflorum, **161**
Williamsii, **162**
Plumeria, 425
tarapotensis, **425**
Poeppigia, 204
procera, **204**
Polygonaceae, **106**
Pongo de Manserriche, 47
Population of Peru, 14
of Departments of Peru, 34
Poraqueiba, 291
sericea, **291**
Posoqueria, **483**
latifolia, **484**
longiflora, **484**
Potalia, 418
amara, **418**
Potato family, **439**
Pourouma, **88**
cecropiaefolia, **88**
Ulei, **89**
Primary forest, 16
Principal rivers, 38
Prockia, 22, 362
septemnervia, **362**
Proteaceae, **98**, 403
Protea family, **98**
Protium, 231, **232**
Carana, 22, **233**
crassifolium, **233**
glaucum, **233**
Llewelyni, **234**
medianum, **234**
puncticulatum, 22, **235**
subserratum, **235**
tenuifolium, **236**
Prunus, 175
Psammisia Ulbrichiana, 30
Pseudolmedia, 20, 22, **89**
multinervis, **90**
sp., **90**
Psidium, **374**
Guajava, 23, **375**
Psychotria, 480, **485**
alba, **486**
alboviridula, **486**
capitata, **487**
cupularis, **487**
falcata, **488**
involucrata, **488**
japurensis, **489**
Psychotria macrophylla, 489
Mathewsii, **489**
nigricans, **490**
racemosa, **490**
viridis, 24, **490**
Pterocarpus, 217
Ulei, 22, **217**
Puca-yaco, 12
Puerto Arturo, 12, 39
Bermudez, 36
Ocopa, 36
Puna, 13, 28, 32
Purus River, 40, 44
Putumayo River, 10, 34, 38, 40, 51
Puya, 28

Quararibea, 310, **316**
guianensis, **316**
Wittii, **317**

Rain forest, high, 26
low, 26
Rainfall, 32
Randia, **491**
armata, **491**
Ruiziana, **492**
spinosa, 53
Tessmannii, **492**
Williamsii, **492**
Rapanea, 403, **404**
chartacea, **404**
leuconeura, **404**
Sprucei, **405**
Raphides, occurrence of (table), 525
Rauwolfia, 426
Duckei, **426**
Rays, broad (table), 522
type of (table), 530
uniseriate (table), 532
Regions, collecting, 60
Remijia, 493
peruviana, **493**
Resin cells, 525
Resources, forest, 40
Rhamnaceae, **298**
Rhamnidium, 299
elaeocarpum, **299**
Rhamnus pubescens, 30
Rheedia, 22, 337, **341**
floribunda, **342**
macrophylla, 20, **342**
Ricinus communis, 264
Ring-porous woods (table), 519
Rinorea, 22, 347, 348, **350**
Rioja, 13, 24
Ripple marks (table), 524
River Amazon, 8, 36, 38, 41, 51
Azupizú, 47
Huallaga, 10, 12, 14, 24, 34, 36, 38, 39, 41, 46, 48, 51, 54
Indoche, 13
Itaya, 8, 10
Javary, 38, 48

River Jurua, 44
Marañón, 10, 34, 38, 51
Masán, 8
Mayo, 12, 13, 24, 34, 36, 41
Morona, 44
Nanay, 8, 10, 38, 41, 48, 51
Napo, 10, 34, 38, 39, 40, 48, 51
Negro, 13
Paranapura, 10
Pastasa, 38, 44
Purus, 40, 44
Putumayo, 10, 34, 38, 40, 51
Tambo, 36
Tambo-yaco, 13
Tigre, 10, 38, 44
Tonchimán, 13
Ucayali, 34, 36, 38, 39, 40, 44, 46, 47, 48, 51, 53
Uquihua, 13
Urubamba, 34, 36, 41
Utcubamba, 30, 47
Rivers, 36
Rollinia, **126**
Roupala, 99, **100**
complicata, 101
Dielsii, **101**
Rosaceae, **167**
Rose family, **167**
Route, 8
Routes, overland, 36
Rubber, 20, 48, 264, 274
exports of, 48
production of, 48, 50
tapping season, 50
trees, 20, 48
varieties of, 48
Rubiaceae, **451**
Rudgea, 24, **493**
amazonica, 16, **494**
canephorantha, **494**
ciliata, **495**
loretensis, **495**
Poeppigii, **496**
retifolia, **496**
Rue family, **222**
Rumisapa, 12, 40
Rutaceae, **222**
Ryania pyrifera, **362**

Sabiaceae, 297
Sabia family, 297
St. Johnswort family, 344
Salicaceae, 68
Salix, 68
chilensis, 30, **68**
San Antonio, 10
Martín, 10, 15, 39, 41, 54, 246
Ramón, 36
Roque, 12, 13, 14, 24
Sanchezia, **450**
rubriflora, **450**
Williamsii, **451**
Santa Rosa, 12
Sapindaceae, **292**
Sapindus Saponaria, 30
Sapium, 22, 264, **282**
Hippomane, **282**
Sapodilla family, **406**
Saposoa, 12
Sapotaceae, **406**
Sapote-yaco, 12
Sassafras officinale, 146
Savanna, 24
Schinopsis, 178, 284
Schizolobium, 205
excelsum var. *amazonicum*, **205**
Schoenobiblus, 22, 366
peruvianus, **366**
Sclerolobium, **206**
paniculatum, **206**
Uleanum, 26, **206**
Seasons, 32
Secondary forest, 16
formation, 22
Securinega, 283
congesta, **283**
Serjania, 53
Setaria geniculata, 24
Shapaja, 12, 14
Sickingia, 22, **496**
tinctoria, **497**
Williamsii, **497**
Sida, 26, 307
cordifolia, 24
Sideroxylon, 20, 407, **413**
cylindrocarpon, **414**
Quinilla, **414**
Ulei, **415**
Williamsii, **415**
Silk-cotton Tree family, **309**
Simaruba, 26
Simarubaceae, 229
Simaruba family, 229
Siparuna, **142**
bifida, **142**
cervicornis, **143**
Gilgiana, **143**
guianensis, 24, **144**
magnifica, **144**
plana, 145
Poeppigii, **145**
thecaphora, **145**
Williamsii, **146**
Sloanea, 22, 300, **301**
Soapberry family, **292**
Solanaceae, **439**
Solanum, 16, 20, 440, **443**
Sommera, 498
sabiceoides, **498**
Sorocea, **91**
Briquetii, **91**
hirtella, **92**
muriculata, **92**
opima, **92**

Souari-nut family, **329**
Spachea, 257, 262
tricarpa, **262**
Special structure (table), 525
Sphagnum, 28
Sphinctanthus, 499
maculatus, **499**
Spondias, 284, **286**
Mombin, 23, **287**
purpurea, 23, **287**
Spruce, Richard, 12
Spurge family, **264**
Staphyleaceae, 290
Sterculia, 318, 320
Tessmannii, **320**
Sterculiaceae, **317**
Steriphoma, 166
peruvianum, **166**
Sticta, 28
Stigmatophyllon tiliifolium, 16
Storied structure (table), 524
Strychnine family, 417
Strychnos, 418
Poeppigii, **418**
Stylogyne, 405
amplifolia, **405**
Subtropical zone, 28
Sugar cane, 39
Sunflower family, **504**
Swamp formation, 16
upland, 26
Swartzia, 22, **207**
amplifolia, **207**
calophylla, **208**
myrtifolia, **208**
pendula, **209**
triphylla, **210**
Swietenia, 237, 245
Krukovii, 44
macrophylla, 16, 18, 22, 26, 238, **245**
Tessmannii, **245**
Symmeria, 107, 109
paniculata, **109**
Symphonia, 343
globulifera, **343**

Tabalosos, 12, 13
Tabebuia, 22, 444, **446**
spp., 447
Tabernaemontana, **426**
Benthamiana, **427**
olivacea, **427**
Poeppigii, **428**
Sananho, **428**
Tachigalia, 210
paniculata, **210**
Tagua, 51
exports of, 52
Talisia, 297
peruviana, **297**
Tambo River, 36
Tambo-yaco, 13
Tanniniferous tubes, 525
Tapirira, 284, **288**
guianensis, **288**
myriantha, **289**
Tapura, 262
guianensis, **262**
Tarapoto, 12, 13, 14, 24, 32, 34, 40, 54
Tarma, 36
Taste (table), 514
Tea family, **335**
Tecoma, 444, **446**
Temperate zone, 28
Temperature, 30
Tephrosia, 53, 217
toxicaria, **217**
Terminalia, **372**
Catappa, 373
oblonga, **373**
Ternstroemia, 335, 336
sp., **336**
Tessaria, 507
integrifolia, **507**
Tetrasida, 307, 309
polyantha, **309**
Tetrathylacium, 363
macrophyllum, **363**
Texture (table), 517
Theaceae, **335**
Theobroma, 22, 318, **321**
Cacao, 18, 318, **321**
ferruginea, **322**, 323
grandiflora, **322**
Mariae, **323**
quinquenervia, **324**
subincana, 18, **324**
Theophrastaceae, 406
Theophrasta family, 406
Thevetia, 428
peruviana, 53, **428**
Thymelaeaceae, 366
Tibouchina, 397
ochypetala, **397**
Tierra baja, 16, 18
Tigre River, 10, 38, 44
Tilia, 301, 345
Tiliaceae, **301**
Tobacco, 40
Tococa, **398**
egensis, **398**
juruensis, **398**
Tocoyena, **499**
amazonica, 16, **500**
foetida, **500**
Williamsii, **501**
Tonchimán River, 13
Torchwood family, **231**
Torrubia, 115
myrtiflora, **115**
Transition stage, 28
Trees, cultivated, 59
Trema, 71
micrantha, 23, **71**

Tribes, Indian, 34
Trichanthera, 448, 449
gigantea, **449**
Trichilia, 22, **249**
flava, **250**
iquitosensis, **251**
Macbrideana, **251**
maynasiana, **252**
peruviana, **252**
Riedelii, **253**
Ruiziana, **253**
sexanthera, **254**
singularis, **254**
tocacheana, **255**
Ulei, **256**
Williamsii, **256**
Triplaris, **110**
Pavonii, **110**
peruviana, **111**
Poeppigiana, **111**
Trophis, **93**
americana var. *meridionalis*, **93**
racemosa, **94**
Trymatococcus, 95
amazonicus, **95**
Turpinia, 290
heterophylla, **290**
Type of rays (table), 530

Ucayali River, 20, 36, 38, 39, 40, 44, 46, 47, 48, 51, 53, 246
Ulmaceae, 71
Ulmus, 71, 432, 445
fulva, 316
Uncaria, 501
guianensis, **501**
Uniseriate rays (table), 532
Unonopsis, **126**
floribunda, **127**
spp., **127**
Upland region, 24
Upper montaña, 28
Uquihua River, 13
Urera, 97
caracasana, **97**
caracasana var. *Miquelii*, 98
Urticaceae, **95**
Urubamba River, 34, 36, 41
Valley, 46
Uses of timber, 40, 55
Usnea, 28
Utcubamba River, 30, 47

Vegetable ivory, 51
exports of, 52
Ventana, 13
Ventilla, 14
Verbenaceae, **435**
Verbena family, **435**
Vernonia, 26, **508**
baccharoides, **508**
brachiata, **509**
Vessel perforations (table), 527
Vessel-ray pit-pairs, 528
Vestured pits (table), 527
Violaceae, **347**
Violet family, **347**
Virola, **134**
calophylla, **135**
cuspidata, **135**
cuspidata var. *membranacea*, **136**
loretensis, **136**
Mocoa, **137**
mollissima, **137**
officinalis, **138**
sebifera, **139**
Weberbaueri, **139**
Vismia, 23, **344**
Vitex, 435, 439
triflora, **439**
Vochysia, 263
Haenkeana, 26, **263**
Vochysiaceae, 263
Vochysia family, 263

Walnut, 16, 47, **68**, 431
exploitation of, 47
family, 68
local uses of, 47
Warscewiczia, 22, **502**
coccinea, **502**
cordata, **503**
Schwackei, **504**
Wedelia, 16
West Indian boxwood, 454
Willow family, 68
Woods, descriptions of, 60

Xylological characters (table), 533
Xylopia, **127**
aromatica, 24, **128**
peruviana, **128**
Xylosma, **364**
pilosa, **364**
Salzmannii, **365**

Yurimaguas, 10, 12, 14, 34, 36, 38, 39, 54

Zanthoxylum, 22, 24, 222, **225**
juniperinum, **226**
Pterota, 26, **227**
Ruizianum, **227**
Sprucei, **228**
valens, **228**
Zingiberaceae, 26
Zones, Amazon, 7
physiographic, 14
Zschokkea, 22, 425, **429**
floribunda, **429**
gracilis, **430**
peruviana, **430**
ramosissima, **431**

THE LIBRARY OF THE
JAN 11 1937
UNIVERSITY OF ILLINOIS

FB
v.15

BOTANICAL SERIES

FIELD MUSEUM OF NATURAL HISTORY
FOUNDED BY MARSHALL FIELD, 1893

VOLUME XV

WOODS OF NORTHEASTERN PERU

BY
LLEWELYN WILLIAMS
ASSISTANT CURATOR OF ECONOMIC BOTANY

B. E. DAHLGREN
CURATOR, DEPARTMENT OF BOTANY
EDITOR

PUBLICATION 377

CHICAGO, U.S.A.
DECEMBER 31, 1936

UNIVERSITY OF ILLINOIS-URBANA
3 0112 018259116